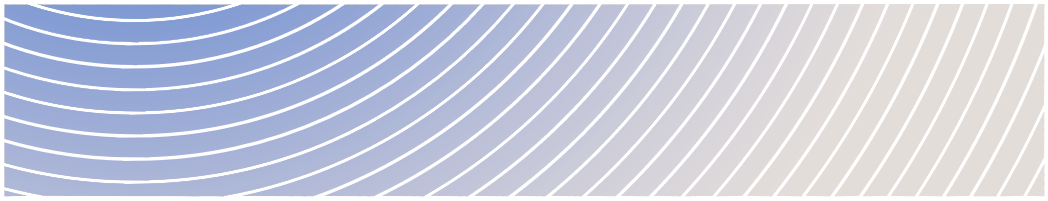
Laurentia Project: Port of Québec Deep-Water Wharf – Beauport Sector



ENVIRONMENTAL ASSESSMENT REPORT

June 2021

Impact Assessment Agency of Canada
Agence d'évaluation d'impact du Canada

Canada

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RAPPORT D'ÉVALUATION ENVIRONNEMENTALE – Projet Laurentia : Quai en eau profonde dans le port de Québec – Secteur de Beauport

Summary

The Québec Port Authority (the Proponent) proposes to extend the line of the existing wharf eastward by 610 metres in order to operate a deep-water terminal dedicated to containerized general cargo. The 31.7 hectare Project would include the construction of a new berth and a retaining dike that would allow the development of an additional 17 hectares of backshore space. The Project also includes the construction of railways and road access, the reconfiguration of two rainwater outlets and of Henri-Bourassa Boulevard with the addition of an overpass, as well as the redevelopment of part of the Port of Québec's existing land for truck loading and the partial relocation of the recreation and tourism area for the development of the operations support area and empty container storage.

The Canadian Impact Assessment Agency (the Agency) is carrying out an environmental assessment of the Project in accordance with the *Canadian Environmental Assessment Act, 2012* (CEAA 2012). The Project is subject to CEAA 2012 as it was designated on July 31, 2015, by the Minister of Environment and Climate Change under subsection 14(2): “The Minister may, by order, designate a physical activity that is not prescribed by regulations made under subsection 84(a) if, in the Minister’s opinion, either the carrying out of that physical activity may cause adverse environmental effects or public concerns related to those effects may warrant the designation.” The environmental assessment continues under CEAA 2012 as it was initiated prior to the coming into force of the *Impact Assessment Act*.

The submitted Project did not undergo a provincial environmental assessment, but collaboration has been established with the Ministère de l’Environnement et de la Lutte contre les changements climatiques du Québec (MELCC) for port expansion projects currently under assessment by the Agency, including that of the Proponent. The approach, developed in the spirit of the *Canada-Quebec Agreement on Environmental Assessment Cooperation,* provides for the participation of the Government of Quebec in the federal environmental assessment under the coordination of the MELCC. MELCC's participation ensures the integration of provincial expertise and perspectives with those of the federal government at each stage of the environmental assessment process.

This Environmental Assessment Report was completed following a technical review of the Environmental Impact Statement and additional documentation from the Proponent, and after an assessment of the potential environmental effects of the Project by the Agency, supported by an Environmental Assessment Committee composed of Environment and Climate Change Canada, Fisheries and Oceans Canada, Health Canada, Parks Canada, Transport Canada, Natural Resources Canada, the Laurentian Pilotage Authority, the Canadian Coast Guard and the MELCC.

As part of the environmental assessment, the Agency also took into account the concerns and comments of the Huron-Wendat Nation, the Grand Conseil de la Nation Waban-Aki, the Mohawk First Nations of Kahnawà:ke, the Innu First Nations of Essipit, Pessamit and Pekuakamiulnuatsh (Mashteuiatsh), and the Wolastoqiyik (Maliseet) Wahsipekuk First Nation. It also took into account the comments of citizens' groups, environmental and economic groups, as well as the public.

In conducting this environmental assessment, the Agency considered the effects that the Project is likely to have on the following components:

- Those under federal jurisdiction, as described in subsection 5(1) of CEAA 2012;
- Those that are directly related to or result from federal decisions enabling the Project to be carried out in accordance with subsection 5(2) of CEAA 2012;
- Species mentioned in the *Species at Risk Act* and their critical habitat, as well as species designated as threatened or vulnerable under Quebec's *Act Respecting Threatened or Vulnerable Species*;
- Species designated by the Committee on the Status of Endangered Wildlife in Canada.

The Agency also considered the factors set out in subsection 19(1) of the *Canadian Environmental Assessment Act, 2012*. In light of concerns raised by the public and various experts from federal and provincial governments, the Agency identified the effects on air quality and human health caused by road and rail transportation associated with the Project, which would take place in the borough of La Cité-Limoilou, as another factor relevant to the environmental assessment under paragraph 19(1)(j) of CEAA 2012[1].

The environmental assessment conducted by the Agency identified potential environmental residual adverse effects, some of which are significant:

- Low project contribution to provincial and national greenhouse gas emissions (transboundary environmental effects from greenhouse gas emissions);
- Significant direct and cumulative effects on air quality and human health related to emissions of particulate matter and contaminants from fossil fuel combustion. Although the Project's contribution to air quality degradation would be small, air contaminants would be emitted into a previously saturated environment where air quality-related health problems are already known. These effects could be expected to decline over time with implementation of recently announced regional air quality initiatives;
- Significant direct and cumulative effects on fish and fish habitat, including striped bass, lake sturgeon, Atlantic sturgeon and American shad, even following the implementation of mitigation, monitoring, offsetting and follow-up measures. Effects would result from infrastructure development and activities that could result in the loss and alteration of rare, complex and valuable habitats, including encroachment and alteration of the water regime, which would adversely affect the population of several fish species;
- Moderate effects on birds and bird habitat, particularly swallows and shorebirds whose loss of habitat would have to be offset. Despite the loss and modification of habitats for other bird species caused by the development of infrastructures or by the activities and the generation of disturbance by noise, light and human presence, no other species would suffer effects that could affect an important phase of their life cycle;

[1] https://iaac-aeic.gc.ca/050/evaluations/document/132490

- Low effects on special-status species since the habitat that would be lost or disturbed by the Project is an industrialized environment that supports mostly marginal, disturbed, small-area habitats;
- Significant direct and cumulative effects on socio-economic conditions related to sport and commercial fishing resulting from the expected significant effects on the fish species harvested. Moderate effects are expected on recreational activities (boating, light sailing, windsurfing, hoverboarding, etc.) and tourism as a result of the development and operation of harbour infrastructures and changes to air and water quality, wind regime or landscape;
- Direct and cumulative significant effects on the current use of lands and resources for traditional purposes and, more specifically on fishing activities, community sharing or the intergenerational transmission of First Nations values and practices due to the expected significant effects on the species of fish caught;
- Moderate effects on physical and cultural heritage, due to the modification of certain features of the heritage landscape. The effect would not compromise the integrity of the physical and cultural heritage or anything of archaeological significance. Nor would the effect compromise the maintenance or management of designated heritage features.

The Proponent has committed to incorporating mitigation measures into the Project that would avoid or minimize its adverse effects. Offsetting measures are also proposed to offset residual adverse effects, if any.

The Agency has identified key mitigation and follow-up measures required to avoid significant adverse environmental effects by taking into account the measures proposed by the Proponent, the opinion of government authorities and comments received from First Nations and the public. However, these measures taken together would not sufficiently mitigate the potential effects of the Project to conclude that these residual effects are not significant.

Furthermore, Fisheries and Oceans Canada considers that the fish habitat offset project would not, under the *Fisheries Act*, adequately offset many of the lost habitats. It would also not ensure the survival or recovery of striped bass, a species protected under the *Species at Risk Act*.

This report mentions the aforementioned First Nations' Aboriginal or Treaty rights that could be affected by the Project. The Agency believes that the Project could have significant direct and cumulative negative impacts on the exercise of the right to fish and on the cultural practices surrounding the exercise of this right.

In the event that the Minister of Environment and Climate Change determines that the Project is likely to cause significant adverse effects, the Minister will refer to the Governor in Council the matter of whether these effects are justified in the circumstances. If the Governor in Council determines that these effects are justified in the circumstances, the Minister will set out the conditions for carrying out the Project in his Decision Statement under CEAA 2012. The conditions set out by the Minister of Environment and Climate Change would be legally binding on the Proponent.

Table of Contents

List of Tables

List of Figures

List of Abbreviations and Acronyms

Abbreviation/Acronym	Definition
Agency	Impact Assessment Agency of Canada
CEAA 2012	*Canadian Environmental Assessment Act, 2012*
COSEWIC	Committee on the status of endangered wildlife in Canada
IAA	*Impact Assessment Act*
IAS	Invasive alien species
EIS	Environmental Impact Statement
QPA / the Proponent	Québec Port Authority
SARA	*Species at Risk Act*
TEU	Foot equivalent units (number of containers measure)
The Minister	Minister of Environement and Climate Change Canada
The Project	Laurentia Project: Port of Québec Deep-Water Wharf – Beauport Sector
This report	Environmental Assessment Report

Glossary

Word	Definition
Wave action	Series of waves produced by the wake of ships and which break against the banks, causing them to deteriorate.
Benthic fauna	Animal species living at the bottom of the water.
Critical habitat	As defined in the *Species at Risk Act*, habitat necessary for the survival or recovery of a listed wildlife species that is identified as such in a recovery strategy or action plan developed for the species.
Ebb	Period of the tide during which the sea retreats.
Environmental Impact Statement	The document prepared by the Proponent that identifies and assesses the environmental effects of the Project, and the measures proposed to mitigate those effects, in accordance with the Environmental Impact Statement Guidelines provided by the Agency.
Environmental Impact Statement Guidelines	A document prepared by the Agency that identifies the requirements for the preparation of the Environmental Impact Statement. This document specifies the nature, scope and extent of the information required from the Proponent for the Project.
Fine particulate matter ($PM_{2.5}$)	Airborne particulate matter with a mass median diameter less than 2.5 micrometres.
Environmental monitoring	Establishment of periodic or continuous controls or verification, according to a predetermined schedule, relating to one or more environmental components. Monitoring is generally aimed at determining the degree of compliance with established requirements or at observing the condition and trends of specific components of the environment over time.
Federal lands	In the case of this project and as defined in CEAA 2012, “federal lands” means: Lands that belong to Her Majesty in right of Canada, or that Her Majesty in right of Canada has the power to dispose of, and all waters on and airspace above those lands.
Follow-up program	A program, whose elements are outlined by the Agency, to verify the accuracy of environmental assessment predictions and verify the effectiveness of mitigation measures.

Government experts	Experts from the governments of Canada and Quebec who collaborated in the environmental assessment process for the Project and who are described in Sections 3.3 and 3.4 of the Environmental Assessment Report.
Inhalable particulate matter (PM_{10})	Airborne particles with a diameter of 10 micrometres or less.
Mitigation Measures	Measures to eliminate, reduce or limit the adverse environmental effects of a designated project. This includes measures to repair any damage caused to the environment by these effects, in particular by replacement, restoration or offsetting.
Monitoring	The implementation of periodic or ongoing monitoring or audits, according to a predetermined schedule, of one or several environmental components. Monitoring is generally intended to determine the degree of compliance with established requirements or to observe the condition and trends of particular environmental components over time.
Particulate matter (PM)	Airborne particles in solid or liquid form.
Tidal range	The difference in level between high-water and low water of the tide.
Total particulate matter (TPM)	Airborne particles with a diameter of less than 100 micrometres.

1. Introduction

The Québec Port Authority is proposing an extension of the current wharf line 610 metres to the east, of which 450 metres will be new wharf line and the remainder rockfill, in order to operate a deep-water terminal dedicated to general containerized cargo (Figure 1). The Project, with a surface area of 31.7 hectares, would include the construction of a new berth and seawall that would allow for the development of 17 hectares of additional space behind the wharf. The Project also involves the construction of railroads and vehicle accesses; reconfiguration of outfalls and Henri Bourassa Boulevard, with the addition of a viaduct; the rehabilitation of a portion of the current Port of Québec lands for truck loading; and the relocation of a portion of the recreational and tourist area to allow for the development of the operational support area and the storage of empty containers.

1.1 Purpose of the Environmental Assessment Report

This Environmental Assessment Report provides a summary of analyses carried out by the Impact Assessment Agency of Canada (the Agency), including the information it has considered in reaching its conclusion on whether the Project is likely to cause significant adverse environmental effects, after the implementation of the proposed mitigation measures.

The Minister of Environment and Climate Change will review the report and will take into account comments from First Nations[2], the public, the Proponent, federal authorities and the Government of Quebec before making a decision under the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) and in accordance with the transitional provisions of the *Impact Assessment Act* (section 181 (1)), which came into effect in 2019.

[2] First Nations consulted: Huron-Wendat, W8banaki, Kahnawà:ke Mohawk, Kanesatake Mohawk, Akwesasne Mohawk, Essipit First Nation, Pekuakamiulnuatsh Takuhikan (Mashteuiatsh), Pessamit First Nation, Wolastoqiyik (Maliseet) Wahsipekuk.

Figure 1: Laurentia Project location

Source: Englobe, 2020

1.2 Scope of Environmental Assessment

1.2.1 Environmental Assessment Requirements

The Project is subject to an environmental assessment because it was designated on July 31, 2015, by the Minister of Environment and Climate change under subsection 14(2) of CEAA 2012, subsequently to a designation request from the Proponent. Following the designation of the Project by the Minister, the Agency began its environmental assessment on August 10, 2015. Because the Project was not an activity designated by the *Regulations Designating Physical Activities*, the Proponent was not required to provide a project description under subsection 8(1) of CEAA 2012. The Agency then held consultations on the draft Environmental Impact Statement Guidelines from August 10 to September 9, 2015, before submitting the final version to the Proponent on October 16, 2015, followed by an updated version on November 2, 2015.

The Project is not subject to a provincial environmental assessment[3], but it is subject to an environmental assessment collaboration agreement between the Agency and Quebec's Ministère de l'Environnement et de la Lutte contre les changements climatiques (MELCC). This collaboration agreement includes the Government of Quebec's participation in the federal environmental assessment of the Project. The MELCC's participation ensures that provincial perspectives will be integrated into those of the federal government at each step of the environmental assessment process.

1.2.2 Elements Taken into Consideration During the Assessment

The Agency published guidelines for the Proponent to help prepare for the Environmental Impact Statement (EIS). The EIS guidelines describe environmental impacts and factors to be taken into consideration in environmental assessment and are available on the Canadian Impact Assessment Registry[4]. The Proponent optimized the Project in January 2020 and added new physical activities. On February 12, 2020, the Agency notified the Proponent that the potential adverse environmental impacts of these activities would also have to be assessed[5].

The scope of the environmental assessment includes port infrastructure, road and rail transportation on the Project site, as well as navigation related to the Project that takes place in the Québec Port Authority's jurisdiction area. Shipping in the St. Lawrence River, Estuary and Gulf downstream of the Project and its effects are therefore not included in the scope of the Project. This decision is based on the relatively small

[3] On 16 April 2020, the Supreme Court of Canada dismissed the application for leave to appeal a 2019 Québec Court of Appeal decision that found that some provincial environmental requirements did not apply to activities under federal jurisdiction carried out on the territory of the Port of Québec (Attorney General of Québec v. IMTT-Québec Inc., 2019 QCCA 1598).

[4] https://www.ceaa-acee.gc.ca/050/evaluations/document/132339

[5] https://iaac-aeic.gc.ca/050/documents/p80107/133865F.pdf

increase in shipping related to the Project (between 52 and 156 ships per year), the existing regulations governing navigation and its effects on marine mammals and the limited influence of the Proponent on shipping activities beyond its jurisdiction area.

Also, as part of the Whale Protection Initiative and the Oceans Protection Plan Collaborative Initiative on the Cumulative Effects of Marine Activities on the St. Lawrence and Saguenay Rivers, the Government of Canada is working with Indigenous groups, scientists, non-governmental organizations, marine industry representatives and provincial governments to better understand the potential impacts of shipping activities on cetaceans and other valued components of marine and coastal ecosystems. Together with its partners, the Government of Canada is developing and implementing several measures to protect marine mammals in the Estuary and Gulf of St. Lawrence, whether through collision risk reduction or underwater noise abatement.

Vessels heading to the Port of Québec will have to comply with the measures implemented by Transport Canada, Parks Canada, and Fisheries and Oceans Canada to protect vulnerable marine mammals, including the St. Lawrence beluga whale population and the North Atlantic right whale. For example, the Minister of Transport puts in place annually mandatory measures for the protection of right whales in the Gulf of St. Lawrence under the *Canada Shipping Act*, prohibiting ships from sailing at speeds greater than 10 knots in areas identified as being frequented by right whales. These protection measures will be updated periodically to take into account the evolution of the ecological context, scientific knowledge and available technologies.

Pursuant to section 19(1) of CEAA 2012, the federal environmental assessment shall include a consideration of the following factors:

- Environmental effects of the Project, including the environmental effects of malfunctions or accidents that may occur in connection with the Project and any cumulative environmental effects that are likely to result from the Project in combination with other physical activities that have been or will be carried out;
- The significance of the environmental effects;
- Comments from the public;
- Mitigation measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the Project;
- The requirements of the follow-up program in respect of the Project;
- The purpose of the Project;
- Alternative means of carrying out the Project that are technically and economically feasible and the environmental effects of any such alternative means;
- Any change to the Project that may be caused by the environment;
- In response to public concerns, the Agency identified project-related road and rail transportation activities in the borough of La Cité-Limoilou and their potential air quality and human health impacts as an additional element to include in the environmental assessment under paragraph 19 (1)(j) of CEAA 2012.

The Agency considered the expert advice of the Government of Quebec, comments from First Nations and the public, and Indigenous knowledge, pursuant to subsection 19(3) of CEAA 2012. Under subsection 79(2) of the *Species at Risk Act*, the Agency, as the responsible authority, took into consideration the Project's adverse effects on species listed on the List of Wildlife Species at Risk (Schedule 1 to the *Species at Risk Act*) and their critical habitats. The environmental assessment also deals with species designated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), as well as species listed under the Quebec *Act respecting threatened or vulnerable species*. The Agency has ensured that measures consistent with any applicable recovery strategy and action plan are taken to avoid, or mitigate and monitor adverse effects on species at risk, should the Project proceed.

Other decisions or the exercise of the following powers under other federal legislation may also be required before the Project can proceed (Table 1). Therefore, in accordance with subsection 5(2) of CEAA 2012, the environmental assessment considered changes to the environment (atmosphere, sound and light, as well as surface and ground water) that could result from these decisions and exercise of powers, as well as any effects on health, socio-economic conditions, physical or cultural heritage, as well as construction, locations or matters of historical, archaeological, paleontological or architectural interest.

Table 1: Decisions that may be required by other federal legislation in order for the Project to proceed

Federal legislation	Type of federal decision that may be required	Project component, activity, or effect related to decision
***Fisheries Act*, section 34.4(2)b) and 35(2)b)**	Authorization	Alteration, disruption or destruction of fish habitat.
***Species at Risk Act*, section 73**	Agreement or permit	Activities affecting listed wildlife species, any part of their residence or critical habitat.
***Canada Marine Act*, sections 28 and 46**	Exercise of powers granted to the Québec Port Authority	Operate a port and acquire the land needed to deliver a project.

The valued components assessed by the Agency are presented in Table 2. Valued components are environmental and socio-economic features of the environment that may be affected by the Project and that have been identified to be of concern by the Proponent, the Agency, First Nations or the public. The Agency focused its assessment of the effects on the valued components pursuant to subsections 5(1) and 5(2) of CEAA 2012, and on species at risk, pursuant to subsection 79(2) of the *Species at Risk Act*.

Table 2: Valued components selected by the Agency

Valued component	Legislative requirements	Rationale
Air quality	CEAA(1) 2012: 5(2)b)(i)	The Project may cause air contaminant emissions and affect air quality in an airshed known for having a contaminant load that already impacts human health. Air quality in Québec City's central neighbourhoods is an issue monitored by government bodies and is of concern to the population of the region.
Transboundary effects – Greenhouse gas emissions	CEAA 2012: 5(1)b)(ii) and 5(1)b)(iii)	The Project could result in emissions of greenhouse gases that could contribute to increased atmospheric levels worldwide and climate change. Effects on atmospheric greenhouse gas levels are assessed, since they affect changes crossing provincial or international borders.
Wetlands(2)	CEAA 2012: 5(1)b)(i) and 5(2)a)	The Project may cause wetland loss or alterations owing to the construction of new infrastructure or through project-related activities. In addition to being habitats for many flora and fauna species, these environments fulfill a number of critical ecological and socio-economic functions. The federal and provincial governments recognize their importance through the *Federal Policy on Wetland Conservation* and the Quebec *Wetland and Water Conservation Act*.
Fish and fish habitat, including special-status species and marine plants(3)	CEAA 2012: 5(1)a)(i) and 5(2)a) SARA(4): 79(2)	The Project is likely to affect fish, aquatic invertebrates and their habitats, including special-status species and their habitats. It may lead to the loss or alteration of habitats through the installation of new infrastructure and activities that would be carried out in and near the water. It could also lead to mortality and disturbed individuals through Project activities and changes (temporary or permanent) to the aquatic environment (noise, water quality, changes to the moisture regime, etc.).
Birds, including special-status species, and their habitats	CEAA 2012: 5(1)a)(iii) – (MBCA(5) protected birds) 5(1)b)(i) – birds on federal lands 5(2)a) – birds not protected by the MBCA SARA: 79(2) – Birds at risk	The Project is likely to affect birds (migratory and non-migratory), including special-status species, and their habitats. The Project could lead to the loss or alteration of habitats owing to the building of new infrastructure and Project activities. The Project could also cause disruption through noise (changes to the soundscape), luminosity and human presence (people, vehicles and infrastructure). The Project could also cause bycatch and behavioural changes and affect bird health.
Other special-status species and their habitats	CEAA 2012: 5(1)b)(i) and 5(2)a) SARA: 79(2) – species at risk	The Project is likely to affect special-status species and their habitat. It could lead to the loss or alteration of habitat as a result of the building of new infrastructure and activities. The Project could also cause disruption through noise (changes to the soundscape), luminosity and human presence (people, vehicles and infrastructure).
Human health	CEAA 2012: 5(2)b)(i) – population of the region	The Project could cause changes to the environment, including air and water quality and the soundscape and luminosity, that are likely to affect the health of the region's population. The Project would be located near residential areas inhabited by a vulnerable population marked by social inequalities in health. It is recognized that the environment in which the Project would be inserted presents a combination of environmental risk factors and nuisances for the health of the population.
Current use of lands and resources for traditional purposes by Indigenous peoples	CEAA 2012: 5(1)c)(iii)	The Project could produce changes to the environment, especially to the terrestrial environment, as well as to fish and fish habitat, which could have an impact on First Nations' current use of lands and resources for traditional purposes, such as fishing.
Socio-economic conditions	CEAA 2012: 5(1)c)(i) – Indigenous peoples 5(2)b)(i) – population of the region	The Project could cause alterations air and water quality, wind regimes, aquatic habitats and landscapes. These changes could have repercussions on the socio-economic conditions of the First Nations and the region's population, including access to recreational and tourism activities (swimming, water sports, etc.), sport, commercial, traditional and contemporary fishing activities, and any activities practised by the First Nations or the population of the region.
Physical and cultural heritage	CEAA 2012: 5(1)c)(ii) and (iv) – Indigenous peoples 5(2)b)(ii) and (iii) – population of the region	The Project may result in changes to the environment that could affect the physical and cultural heritage, including physical, cultural, historic, archaeological, paleontological or architectural sites from the standpoint of First Nations or the population of the region.

(1) CEAA: *Canadian Environmental Assessment Act, 2012*
(2) As defined in: Environment Canada, 1991. *Federal Policy on Wetland Conservation*, 16 pages.
(3) Special-status species include species listed under federal (Annex 1 of the *Species at Risk Act*) and provincial legislation (list of species designated as threatened or vulnerable in Quebec and species assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).
(4) SARA: *Species at Risk Act*
(5) MBCA: *Migratory Birds Convention Act, 1994*

1.2.3 Methodology and Approach

The Agency, in conjunction with the environmental assessment technical committee and the Government of Quebec, has defined and assessed the Project's adverse environmental impacts based on various sources of information, including:

- The Environmental Impact Statement submitted by the Proponent in October 2016;
- Additional information provided by the Proponent during the environmental assessment;
- The comments, concerns and knowledge of the public and First Nations;
- The advice of federal and Government of Quebec experts.

The Agency studied the adverse impacts on the valued components in accordance with the Agency's Operational Policy Statement[6]. The Agency's assessment included both direct effects from the Project and those effects that may result from predicted changes to the environment. The Agency then determined the residual effects after taking mitigation measures into account (including offsetting programs) proposed by the Proponent and those deemed necessary by the Agency. The Agency used a matrix to determine the importance of the low, moderate and high-level residual adverse impacts on each of the valued components. The definitions or limits of each of the criteria are presented in Appendix A.

The Agency found that the high-level residual adverse impacts are significant under CEAA 2012, while the moderate to low-level residual impacts are considered inconsequential. The assessment criteria defined by the Agency for characterizing the significance of residual adverse effects after taking into account mitigation measures are as follows:

- **Magnitude**: Indicates the degree of change that a valued component would undergo as compared to the baseline conditions. The magnitude assessment takes into account the ecological and social context of the component. Magnitude may take into account the time the effect would occur, e.g., refer to a phase in the life cycle of the component (migration, reproduction, feeding, etc.) or to a period during which a cultural, spiritual or recreational practice would be initiated by a First Nation or population (hunting season);
- **Extent**: Geographical area over which the adverse impacts would occur;
- **Duration**: Period of time during which the adverse impacts would be felt;
- **Frequency**: Pace at which the adverse impacts would occur during a given period;
- **Reversibility**: Likelihood that a valued component would recover from the Project's adverse impacts.

[6] Determine the likelihood that a designated project will have significant negative environmental impacts under the *Canadian Environmental Assessment Act, 2012*

Spatial and Temporal Limits

Spatial boundaries identify the geographic areas within which the potential effects from the Project may occur (Figures 2 and 3). Generally speaking, this report takes into account the following spatial boundaries, established by the Proponent in its impact statement:

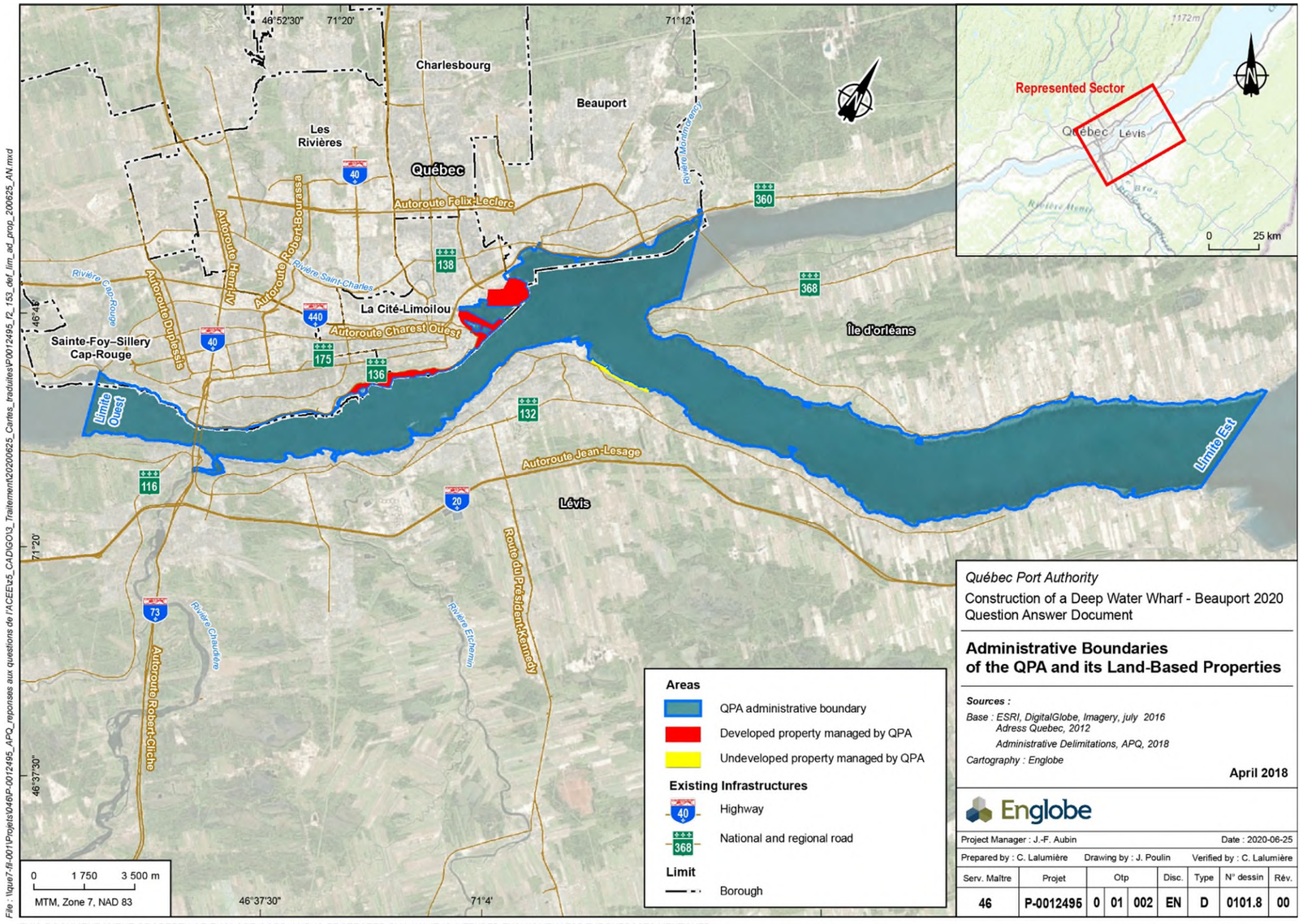
- **Work site**: The site of the planned work, including a 500-metre strip along the periphery, excluding the western boundary of the Dufferin-Montmorency highway. All the construction work will be carried out within this area, as well as activities that would be occurring during the operation of the new port facilities;
- **Study area**: This area is used to obtain better representativeness of the valued components of the biological and human environments that are nearby or likely to be used, but primarily owing to environmental and social concerns;
- **Extended study area**: This area is used to assess the effects on environmental valued components over a broader geographic area;
- **Airshed area**: This area is used to assess the Project's impact on air quality, as well as the health and socio-economic levels;
- **Québec Port Authority administrative boundary zone**: Under the *Canada Marine Act*, this zone consists of the navigable waters under the Québec Port Authority. This area is used to assess the Project's impacts on the valued components of the environment and describe the use of navigable waters.

Temporal boundaries are set to take into account all Project activities likely to cause adverse environmental effects. This report takes into account the temporal boundaries of the construction and operational phases.

- **Construction phase**: This phase is estimated to last 36 months, once permits and authorizations are obtained.
- **Operational phase**: This phase is estimated at more than 75 years, which is the serviceable life span of the planned port facilities.

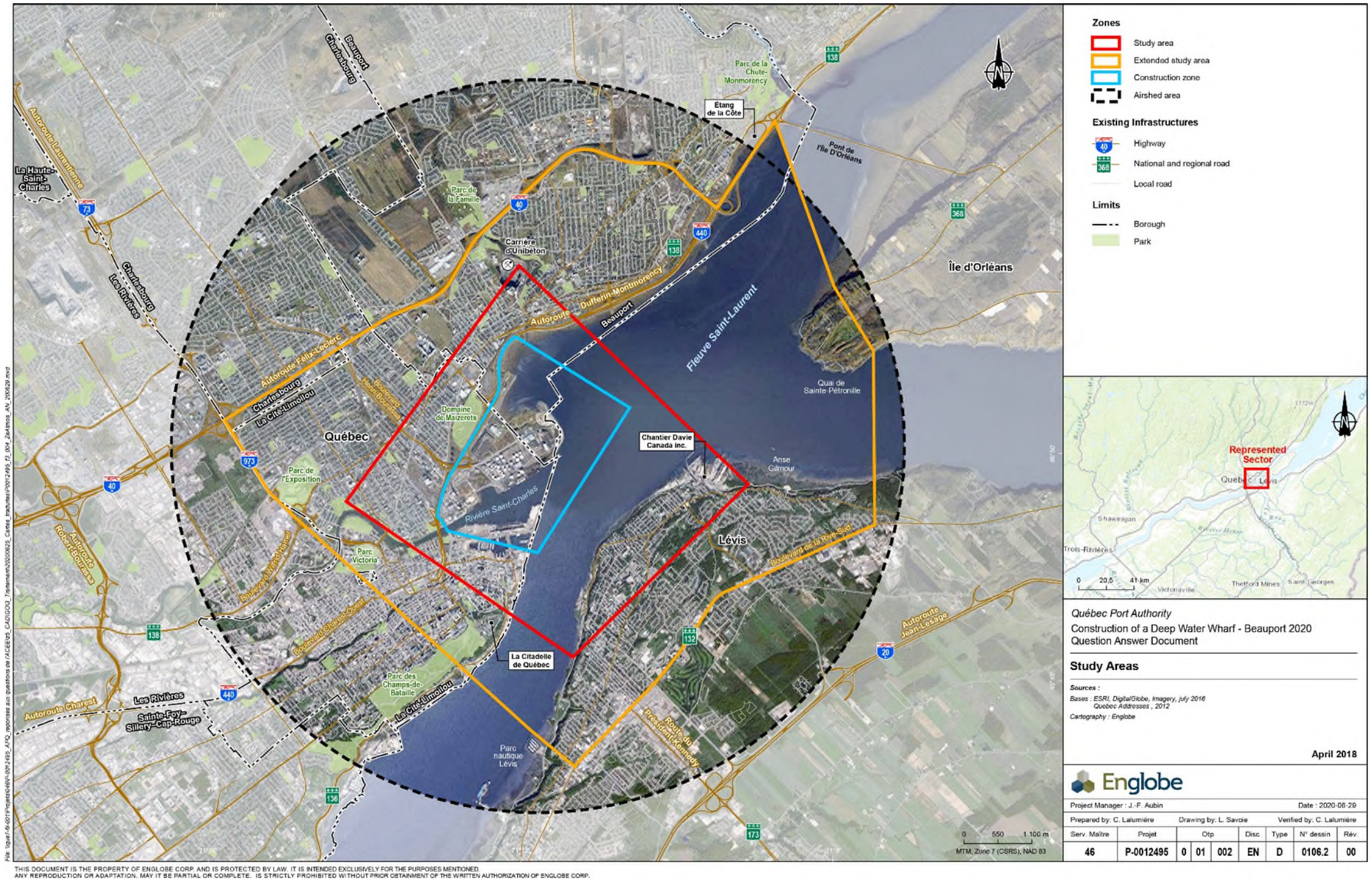
No closure phase is considered, since no medium or long-term cessation of operations is anticipated by the Québec Port Authority.

Figure 2: Administrative boundaries of the Québec Porth Authority and its land-based properties



Source: Englobe, 2018b

Figure 3: Project study areas



Source: Englobe, 2018b

2. Project Overview

2.1 Project Location and Regional Context

The Project is located on federal lands for which the Québec Port Authority (QPA) is in charge, within the administrative boundaries of the Beauport borough in Québec City, near the borough of La Cité-Limoilou (Quebec). This area along the St. Lawrence River covers approximately 90 hectares and is mostly used for industrial activities. Some recreational activities also take place in the Beauport port sector, namely in the Baie de Beauport. Parts of this Project encroach upon the traditional territories of several Indigenous peoples (see Chapters 6 and 7 of this report).

The Project site is located on inhabited land. The residences and buildings nearest to the Projected wharf line are 1.8 kilometres from the borough of Beauport and 1.9 kilometres from the borough of La Cité-Limoilou. The city of Lévis, located on the south shore of the St. Lawrence, is 1.5 kilometres from the proposed Project and the municipality of Sainte-Pétronille, on Île d'Orléans, is 4.1 kilometres away. Québec City has a population (2016) of 531,902, Lévis has a population of 143,414, and Sainte-Pétronille has a population of 1,041, with an average population density (number of people per square kilometre) of 1,171, 320 and 240, respectively. Specifically, the boroughs of Beauport and La Cité-Limoilou have respective populations of 80,925 and 107,885, with an average population density of 1,089 and 4,864 people per square kilometre.

2.1.1 Changes to the Project During the Environmental Assessment

An initial Environmental Impact Statement was submitted on March 11, 2016. At the time, the area behind the wharf was separated into three distinct zones for various transhipment activities, including dry bulk, liquid bulk and containers. In December 2017, the Proponent announced a change in the Project's design and purpose in order to meet an economic need, by changing the use of the wharf to container storage only. In May 2019, the Québec Port Authority signed a commercial agreement with Hutchison Port Holdings Limited and the Canadian National Railway Company (CN). The agreement resulted in changes to the Project to optimize the container terminal concept from an operational standpoint. New physical activities were added to the Project as a result of the improvements proposed by the Proponent.[7]

[7] Letter from the Agency to the proponent from February 12, 2020, for the determination of new physical activities and the information request concerning the optimization document for the Laurentia Project [French only]: https://iaac-aeic.gc.ca/050/documents/p80107/133865F.pdf

2.2 Project Elements

2.2.1 Project Components

The main components of the Project are listed in Tables 3 and 4. Their geographic locations are illustrated in Figures 4 and 5.

Table 3: Main project components

Component	Description
Wharf and area behind the wharf	• Extension of Wharf 53 by 610 metres into deep water, including a 450-metre-long berth made of precast reinforced concrete caissons and rockfill in order to operate a container terminal for general cargo; • Rockfill seawall between the Projected wharf line and the shore to develop an additional area behind the wharf (17 hectares) for handling and storing general containerized cargo.
Areas dedicated to operating the terminal	• Developing areas across the entire terminal. Including dismantling the existing infrastructure and relocating it when applicable: • Port operations area (4.3 hectares) including four 86-metre electric semi-automatic STS (ship-to-shore) gantry cranes, the installation of fuel resupply tanks for the port vehicles and radiation detection equipment. • Container handling area (8 hectares) to store containers. Overhead gantries on semi-automatic electric rails with a maximum height of 32 metres would be used for handling the containers. • Train loading area (5.9 hectares) for loading containers onto trains and unloading them. This area would have five 450-metre long tracks, a switch system and a 350-metre-long track for repairing train cars. • Truck loading area (3.6 hectares) to load and unload ten trucks simultaneously using automatic straddle carriers. • Rail transition area (1.4 hectares). • Areas dedicated to operations support (0.6 hectares) including buildings, parking space, storage areas for empty containers and space for storing and maintaining equipment.
Permanent access ways	• Permanent railways that connect the terminal's train loading area to the CN marshalling yard in Beauport and that have an approximately 700-metre double transition rail and an approximately 540-metre single rail. • Reconfiguration of Henri-Bourassa Boulevard over approximately 415 metres after the Dufferin-Montmorency autoroute interchange. • Approximately 578-metre section of new road connecting to a new approximately 27-metre long overpass that crosses the transitional tracks to provide access to the Québec City snow dump, its filtration and biomethanization plant and users of the Baie de Beauport. • Reconfiguration and relocation, by approximately 350 metres, of the main access to the Beauport industrial sector in the Port of Québec. Including the reconfiguration and relocation of the current gatehouse in its right-of-way. • Approximately 4.34-hectare gatehouse for trucks to control and optimize truck transit in the terminal. This includes dismantling and relocating the IMTT-Québec rail yard. • 924-metre service road for maintenance to the connecting railway.
Visual and acoustic barrier	• Visual and acoustic barrier that will serve as a sound abatement wall and a visual barrier between the Baie de Beauport recreational area and the container terminal, with an approximate length of 575 metres and a height ranging from 3 to 8.5 metres.
Recreational tourism area	• Area for temporary handling and storing of small vessels and temporary launch ramp for those vessels. • Permanently moving the watch tower to the northeastern point of the recreational tourism area. • Permanent launch ramp on the seawall, and configuration of a storage area for small crafts and floating docks.
Temporary infrastructure (construction phase)	• Temporary roads: • Extension of Henri-Bourassa Boulevard from rue du Ressac to reach the main work site; • Two access roads from rue du Ressac, one connecting to Plot[8] 2, which is destined for work-site facilities, and one connecting to Plot 3, which is reserved for the dewatering tank for contaminated sediment and the collection tanks for dewatering water. • Approximately 660-metre-long railway alongside Henri-Bourassa Boulevard that extends into the area behind the wharf. • Settling tank for uncontaminated sediments. • Dewatering tank for contaminated sediments and collection tanks for dewatering water (Plot 3). • Temporary concrete production plant on Wharf 26 (Plot 1). • Area for work site operations, including site trailers and storage areas for equipment and materials (Plot 2). • Transhipment area for contaminated sediments at Wharf 49 (Plot 4).

[8] The Project plots for the construction phase are presented in Chart 1 of Appendix A in Englobe (2020). *Optimisation au projet Laurentia et effets présentée à l'Agence d'évaluation d'impact du Canada* [French only].

2.2.2 Project Activities

The activities required to complete the Project are described in Table 5 according to the Project's life cycle phases, namely construction and operation. No closing date has been scheduled for the infrastructure necessary for handling, storing and transporting containers. The new port installations will not be subject to any shutdowns in the medium to long term.

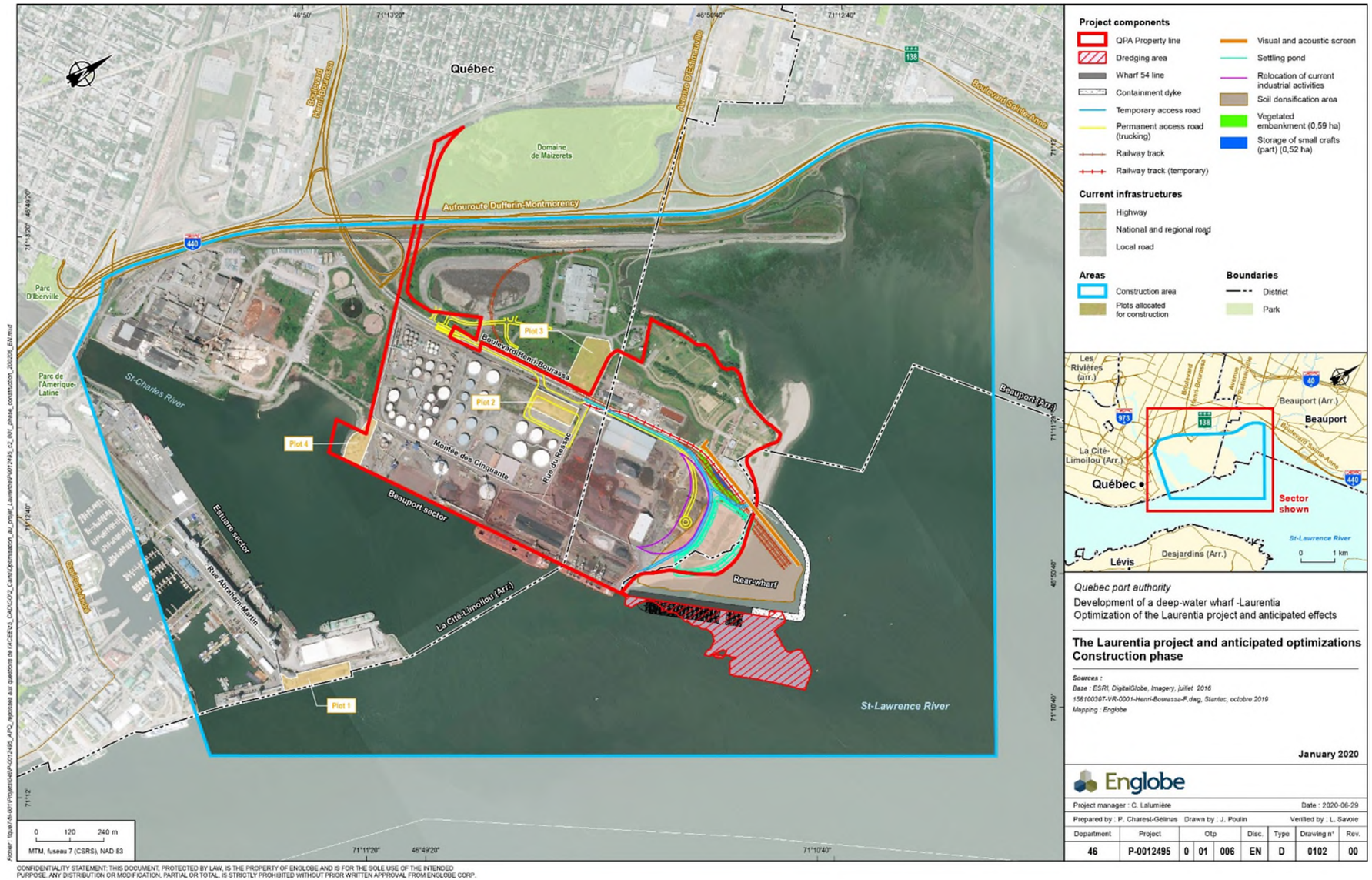
Table 4: Project activities and duration

Physical activities	Description of activities
Construction phase: Approximately 3 years	
Work site preparation	• Clearing, stripping, excavating, levelling, filling, compacting and resurfacing the ground. • Installing infrastructure for rain drainage and cleaning the site. • Dismantling the existing access ways, roads, buildings and fences. • Installing the construction site infrastructure and equipment (operations building, parking, lighting and fences).
Construction work on land	• Building and developing the areas dedicated to terminal operations identified in Table 3. This involves the activities required for dismantling, decommissioning, closing or relocating the materials or infrastructure already on the site, including dismantling and relocating the International-Matex Tank Terminals (IMTT-Québec) rail yard. • Installing all of the equipment required for the terminal, including fuel supply tanks and equipment for detecting radiation. • Building, using and dismantling a temporary railway for transporting construction materials. • Building and paving the permanent and temporary road and rail access ways identified in Table 3. • Installing the electric gantry cranes: • Dynamic compacting or vibrocompacting to densify the ground under the gantry cranes; • Building the foundation for the back rails and installing a concrete beam; • Installing the steel piles (approximately 406). • Installing a water main system, a fire protection system, a storm sewer system, a drainage network and an underground electrical system. • Modifying and extending the Québec City emergency outlet by approximately 100 metres and the outlet from the Arrimage Saint-Laurent sedimentation pond by approximately 120 metres. • Temporarily reconfiguring the area for handling and storing small vessels and a launch ramp. • Reconfiguring and relocating part of the recreational tourism area (Baie de Beauport) including developing an area for handling and storing small vessels, a launch ramp, floating docks and the watch tower. • Building and installing a visual and acoustic barrier. • Installing permanent infrastructure for electrical distribution.
Construction work in water and configuration of the space behind the new wharf	• Installing, operating and maintaining the temporary concrete production plant on Wharf 26 (Plot 1). • Building 15 reinforced concrete caissons on a submersible platform: transporting, installing and filling the caissons with materials and concrete. • Filling in the area behind the work and carrying out soil densification work. • Installing anti-scouring slabs and wharf accessories. • Building the rockfill seawall.
Dredging and sediment management	• Mechanically dredging a trench in the location the concrete caissons will be. • Capital dredging required for the operating and docking area, using two dredging techniques: hydraulic dredging (most of the time) and mechanical dredging. • Configuring, operating, maintaining and dismantling a settling tank (uncontaminated sediments) and a dewatering tank (contaminated sediments). Transporting and using uncontaminated sediments to fill in the area behind the wharf. Disposing of the contaminated sediments in an authorized location. • Configuring a transhipment area for contaminated sediments (Wharf 49–Plot 4).
Contaminated soil management	• Excavating, segregating, managing and disposing of contaminated soil in an authorized location including the soil from the existing vegetated slope (approximately 19,600 m^3). • Disposing of the existing asphalt in accordance with current regulations.
Water management	• Managing runoff water from the work site including Wharf 54. • Managing water from the settling tank for uncontaminated sediments and the dewatering tank for contaminated sediments. • Managing waste snow;
Transportation of materials and vehicle traffic	• Transporting granular materials by train (243 trains with 90 cars each) for the construction of the caissons, filling the area behind the wharf and building the terminal, except for the following materials: • Asphalt covering and temporary railroad ballast by dump truck (approximately 5,867 trucks). • Concrete for the cope wall and rail supports (approximately 1,163 concrete mixers). • Granular materials by truck (approximately 4,374 trucks) and concrete (approximately 190 concrete mixers) for the reconfiguration of Henri-Bourassa Boulevard, construction of the permanent access ways and overpass, construction of the gatehouse for trucks, space for operations support and storing empty containers and the foundations for the transition rail.
Waste management and disposal	• Storing final waste (debris, scrap, non-reusable objects and materials) in containers designated for that purpose. • Managing recyclable waste and transporting it to appropriate locations; • Storing hazardous materials according to applicable regulations and transporting them to authorized locations.

Physical activities	Description of activities
Operational phase: Approximately 75 years	
Operation of deep-water container terminal	• Operating a deep-water terminal for containerized cargo with a useable area of 31.7 hectares with a maximum estimated functional capacity for handling and storage of 700,000 twenty-foot equivalent units per year (TEU/year).[9] • Receiving import containers and shipping export containers. • Maximum use of the wharf by container ships estimated at 13,100 TEU. • Receiving between 52 and 156 container ships at the wharf per year ranging in size from 3,000 TEU to 13,000 TEU (maximum size). • Marine navigation and managing navigation inside the administrative area of the Port de Québec. • Operating the terminal includes using and maintaining the areas described in Table 3.
Transportation and vehicle traffic	• Transporting 90% of containers by train and 10% of containers by truck, where the volume carried by trains would be 630,000 TEU and the volume carried by trucks would be 70,000 TEU; • Intermodal train transportation, with one train for import and one for export every day, seven days per week, with a maximum train length of 12,000 feet; • Transportation estimated at 90 trucks per day, 6 days per week for a total of 28,378 truckloads per year.
Infrastructure maintenance	• Maintaining the buildings, infrastructure and the visual and acoustic barrier; • Using and maintaining fuel tanks to supply the port vehicles and using and maintaining equipment for detecting radiation. • Cleaning terminal surfaces and roads, removing snow, maintaining equipment for rainwater management, repairing road surfaces, maintaining rails, replacing lighting equipment, repairing wharf ladders, painting, and other maintenance work.
Maintenance dredging and sediment management	• Dredging sediments and segregating, managing and disposing of uncontaminated sediments on Québec Port Authority property designated for that purpose and in an authorized location when the sediments are contaminated.
Supply activities	• Resupplying vessels with drinking water and fuel.
Water management	• Managing runoff water with a storm sewer system and management equipment (sediment traps, sediment barriers, infiltration devices, hydrodynamic separators, geotextile tubes, watertight tarps). • Managing waste water using waste water storage tanks. The water will be disposed of outside the property of the Québec Port Authority in accordance with applicable regulations. • Managing waste snow and transporting it to Québec City authorized locations. • Managing bilge water, black water and grey water through a mandated shipping agent and a service provider that specializes in collecting that kind of waste.
Waste management	• Storing final waste (debris, scrap, non-reusable objects and materials) in a container designated for that purpose. • Managing recyclable waste according to applicable standards and requirements. • Collecting international waste by sweeping. Disposing of cargo waste according to applicable laws.

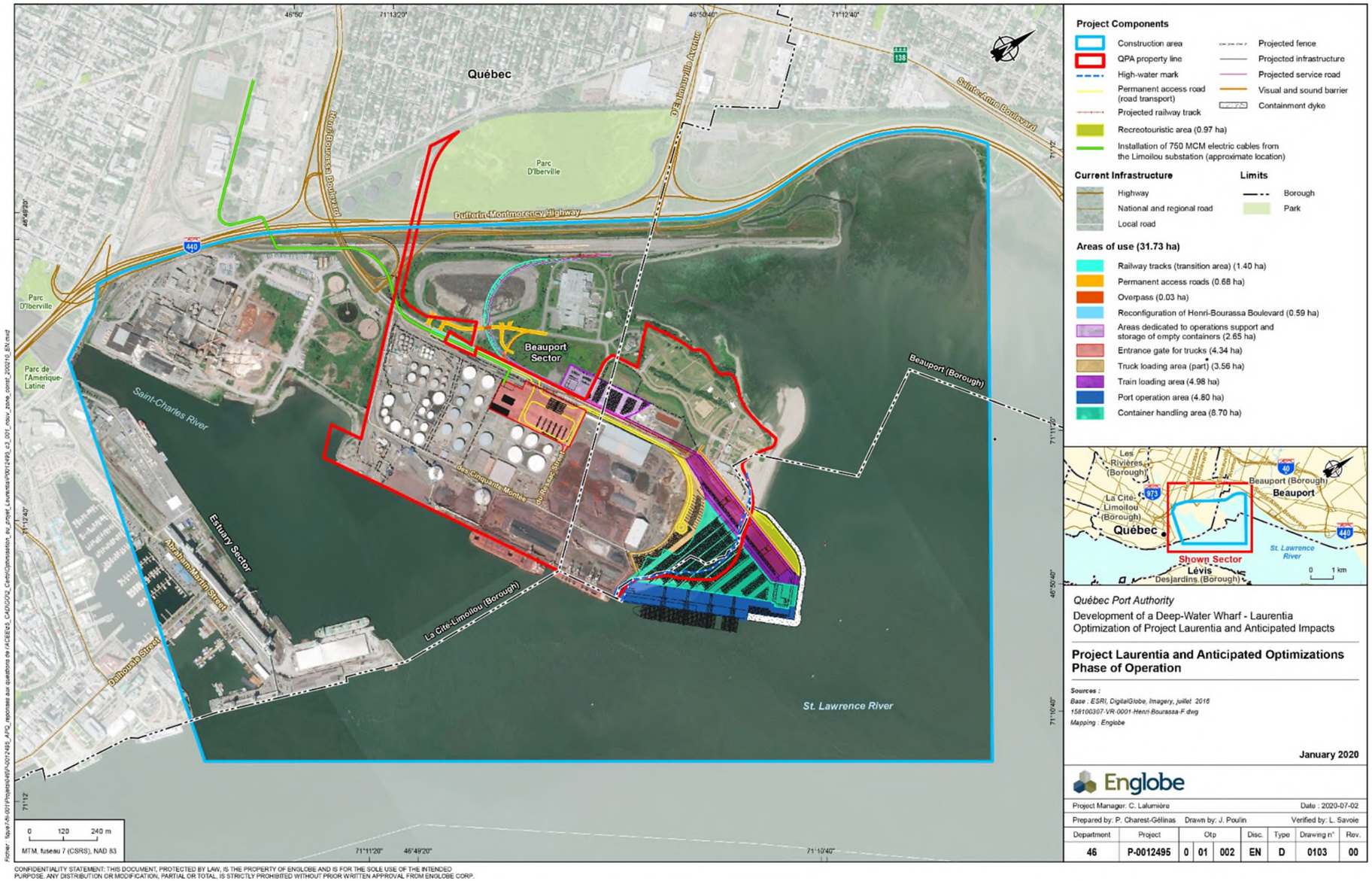
[9] Twenty foot equivalent unit (TEU): Unit used to measure container capacity. Most containers are 20, 40 or 53 feet in length. In order to measure their volume, these lengths are converted into twenty-foot equivalents. Therefore, a 20-foot-long container has a 1 to 1 ratio, and a 40-foot-long container has a 2 to 1 ratio (meaning it is equal to two TEUs) (ENGLOBE, 2020, *Optimisation au projet Laurentia et effets présenté à l'Agence d'évaluation d'impact du Canada*, pages 2–6 [French only]).

Figure 4: Project components in the construction phase



Source: Englobe, 2020b

Figure 5: Project components in the operational phase



Source: Englobe, 2020b

2.3 Other Factors Considered Under Paragraph 19(1)(j) of the *Canadian Environmental Assessment Act, 2012* (CEAA 2012)

Because of the concerns raised by the public, the Agency identified the impact of road and rail transportation associated with the Project and their potential effects on air quality and human health in the borough of La Cité-Limoilou as another factor to consider in the environmental assessment under paragraph 19(1)(j) of CEAA 2012.[10] These activities are not within the scope of the environmental assessment, but the information and concerns collected, summarized in Chapter 8, will be taken into account in the Minister's decision. The issues raised focus primarily on transportation activities outside the Project site during the construction and operational phases with respect to managing air quality, noise and light.

[10] https://iaac-aeic.gc.ca/050/evaluations/document/132490

3. Consultation Activities and Advice Received

The Agency has written the Environmental Assessment Report taking into account comments from the public, Indigenous peoples and government experts. Local and traditional knowledge were also considered in identifying potential environmental effects. The Agency, in collaboration with the environmental assessment technical committee, conducted consultation activities with the public and Indigenous peoples at key stages of the process. These activities, which were posted on the Canadian Environmental Assessment Registry,[11] deal with the following documents:

- The draft Environmental Impact Statement Guidelines (August 10 to September 9, 2015);
- The summary of the Proponent's Environmental Impact Statement (January 4 to February 10, 2017);
- Updating the Project and the impact statement (May 29 to June 28, 2019; an additional comment period to take into account Project repurposing).
- Draft Environmental Assessment Report and potential conditions (November 16 to December 16, 2020).

After considering all comments, knowledge and advice received, the Agency finalized the Environmental Assessment Report and Conditions for submission to the Minister of Environment and Climate Change for his decision under the *Canadian Environmental Assessment Act, 2012* (CEAA 2012).

3.1 Crown Consultation

3.1.1 Crown Consultation Conducted by the Agency with First Nations

The federal government has a duty to consult Indigenous peoples and, where appropriate, provide accommodation when considering measures that may have detrimental effects on established or potential Indigenous or treaty rights protected by section 35 of the *Constitution Act,* 1982. Consultation with Indigenous peoples is also undertaken more broadly as an important part of good governance, valuable policy development and sound decision-making. Indigenous peoples have a unique role to play in the environmental assessment of projects. The Agency recognizes the special constitutional relationship between the Crown and Indigenous peoples and the special knowledge, perspectives and interests they bring to the process.

[11] https://ceaa-acee.gc.ca/050/evaluations/proj/80107?&culture=en-CA

For the purposes of the environmental assessment, the Agency served as the Crown Consultation Coordinator to facilitate a whole-of-government approach to consultation. The First Nations invited to participate in the consultations are those whose potential or established Indigenous or treaty rights could potentially be adversely affected by the Project. As part of the Laurentia Project, these are:

- Huron-Wendat Nation
- W8banaki Nation
- Mohawk First Nation of Kahnawà:ke
- Mohawk First Nation of Kanesatake
- Mohawk First Nation of Akwesasne
- Essipit First Nation
- Pekuakamiulnuatsh First Nation (Mashteuiatsh)
- Pessamit First Nation
- Wolastoqiyik (Maliseet) Wahsipekuk First Nation

The Agency consulted with First Nations in a manner that was integrated into the environmental assessment process. During the environmental assessment process, the Agency provided opportunities for these First Nations to communicate their concerns and views on the Project through phone calls, emails, letters and face-to-face meetings. In addition, First Nations were invited to participate in public consultations. A number of First Nations consulted provided written comments at various stages of the assessment. These comments were intended to provide observations on the content of the documents submitted for consultation, as well as to raise concerns and address the issues raised by the impact mitigation measures. The Mohawk Council of Kahnawà:ke, the Huron-Wendat Nation, the Grand Council of the Waban-Aki Nation and the Wolastoqiyik Wahsipekuk First Nation have also collaborated with the Agency on the preparation of an assessment of the potential impact of the Project on their respective rights. Although these analyses could not be completed prior to consultation on the draft Environmental Assessment Report, they were completed prior to the writing of this final report. Despite communication sent to Kanesatake and Awesasne First Nations, these First Nations have not provided information to the Agency or the Proponent regarding their uses and rights and the potential effects of the Project on these uses and rights.

Through its Participant Funding Program, the Agency administers funding to support the participation of potentially affected Indigenous peoples in the environmental assessment process. A total of $221,494.82 from the Participant Funding Program was allocated to the following First Nations (Table 5).

Table 5: Funding allocated to First Nations by the Participant Funding Program

Indigenous Community	Amount Allocated
Conseil de la Nation huronne-wendat	$57,243.30
Grand Conseil de la Nation Waban-Aki	$31,609.02
Mohawk Council of Kahnawà:ke	$39,850.00
Pekuakamiulnuatsh Takuhikan (Mashteuiatsh)	$15,780.00
Conseil de la Première Nation des Innus Essipit	$15,922.50
Wolastoqiyik (Maliseet) Wahsipekuk First Nation	$57,290.00
Conseil des Innus de Pessamit	$3,800.00
TOTAL	$221,494.82

The Agency proposed consultation plans to these First Nations detailing consultation activities at different stages of the environmental assessment. These plans were then adapted according to the needs expressed during a teleconference on December 15, 2015, with Essipit and Pekuakamiulnuatsh (Mashteuiatsh) Innu First Nations and during meetings organized with the Huron-Wendat Nation on December 8, 2015, as well as with the Mohawk Council of Kahnawà:ke on December 9, 2015. These meetings were also an opportunity to present the CEAA 2012 environmental assessment process and the next steps in the assessment of the Project. On June 3, 2016, the Agency again met with the Huron-Wendat Nation with the goal of further discussing the opportunities for consultation throughout the environmental assessment process. Another objective of this meeting was to separate the roles and objectives of the consultations held by the Agency from those of the Proponent. The Agency met with the Grand Conseil de la Nation Waban-Aki as well as the Mohawk Council of Kahnawà:ke on February 14 and 22, 2017, respectively, to hear their concerns and comments regarding the Environmental Impact Statement and present the path forward for the environmental assessment. Between January 15 and March 27, 2019, the Agency met with the Wolastoqiyik (Maliseet) Wahsipekuk First Nation, the Innu First Nation of Essipit, the Innu First Nation of Pessamit, the First Nation of Pekuakamiulnuatsh (Mashteuiatsh), the Mohawk Council of Kahnawà:ke, the Grand Conseil de la Nation Waban-Aki as well as the Huron-Wendat Nation regarding updates to the Project and to present the Agency's methodology for assessing impacts on Indigenous or treaty rights. Between January and October 2020, the Agency met and had various exchanges on several occasions with these same First Nations regarding the assessment of impacts on their rights in a spirit of ongoing collaboration. First Nations were also consulted and met with on the draft Environmental Assessment Report. The concerns and comments shared, summarized in Appendix D, were taken into account in finalizing the report. Feedback was provided to First Nations on how their comments were incorporated into the final version of the report. Some of them (the Grand Council of the Waban-Aki Nation, the Huron-Wendat Nation and the Innu First Nations) were also met by videoconference on this subject.

The main concerns raised related to the following:

- The Project's impact on certain migratory species of fish of concern, including Atlantic and lake sturgeon;
- The impact of the Project on fish and fish habitat, particularly on the striped bass, an endangered species;
- The potential impacts of the Project on their rights (especially fishing rights) and customary laws;
- The cumulative effects resulting from the various port-related projects on the St. Lawrence River and in particular those induced by the increase in maritime traffic;
- The importance of consulting with First Nations on mitigation or offsetting measures that may affect their Indigenous rights;
- Access to territory and knowledge transfer.

Details on the comments and concerns identified are listed in Section 5.9 regarding current uses of lands and resources for traditional purposes and in Chapter 7 regarding impacts on Indigenous and treaty rights. Appendix D summarizes the Crown's consultations with Indigenous groups. All of these comments have been considered in preparing this report.

3.1.2 Indigenous Engagement Activities Organized by the Proponent

Information obtained by the Proponent about the Indigenous groups' current uses of lands and resources for traditional purposes, as well as the Proponent's assessment of potential impacts of the Project on Indigenous or treaty rights, helped to inform the federal government's consultation process. As early as spring 2015, the Proponent engaged with the First Nations identified by the Agency to discuss issues and concerns. Consultations and engagement activities organized by the Proponent included:

- Contact by email and phone;
- Face-to-face meetings, working meetings, information and document sharing;
- A permanent working panel with the Huron-Wendat Nation;
- A survey questionnaire;
- Tours of the Port of Québec facilities were given for representatives of the Mohawks of Kahnawà:ke and the Huron-Wendat, among others;
- The possibility of producing additional studies with the Huron-Wendat Nation.

3.2 Public Consultation

3.2.1 Public Consultation Conducted by the Agency

The Agency provided four opportunities to participate in the environmental assessment process by submitting comments and concerns directly to the Agency or through the Environmental Assessment Registry. The Agency also considered comments received throughout the environmental assessment process. The people and groups that expressed an interest in the Project was directly informed by email or phone of the consultation opportunities.

During the review of the Environmental Impact Statement filed by the Proponent, the Agency held an open house session, as well as three public meetings with the Proponent and experts from the governments of Canada and Quebec. These consultations brought together about 350 people. They were held in Québec City, including an open house on January 31, 2017, and three public meetings on February 1 and 2, 2017 accompanied by an external moderator to facilitate public involvement. These consultation activities provided opportunities for members of the public to learn more about the environmental assessment process and the Project, as well as to comment on the Proponent's Environmental Impact Statement.

On January 12, 2017, prior to the open house session and public meetings, the Agency met with citizen groups that may be more directly affected by the Project and that had expressed an interest in meeting with the Agency. The purpose of this meeting was to inform the groups of the consultation opportunities, prepare them for the consultations on the Environmental Impact Statement and inform them of the next steps in the environmental assessment.

Following the Project's repurposing and the Proponent's updates to the impact statement, the Agency held an additional public consultation period between May 29 and June 28, 2019, to hear the public's and First Nations' concerns about this repurposing and the potential new effects.

During the fourth public consultation period on the draft Environmental Assessment Report and potential conditions, the Agency held consultation sessions on different topics on November 24, 25 and 26, 2020 with citizen and environmental groups that had expressed interest, as well as two public sessions on December 8 and 10, 2020. These sessions were conducted virtually in order to respect the health guidelines established by the Government of Quebec to fight the Covid-19 pandemic. A total of 44 briefs and 466 comments were forwarded to the Agency during this last consultation period.

Comments and submissions are available on the Canadian Impact Assessment Registry.

The main concerns raised by the public in the consultation related to the following:

- The Project's contribution to the economy and job creation in the region;
- The justification, rationale and alternative means of achieving the Project;

- The scope of the Project, notably because it does not take into account the exclusion of transportation activities related to the Project but which take place outside the limits of the Port of Québec;
- The effects of increased transportation (marine, road and rail) on the physical and biological environment, the risk of accidents and malfunctions, safety (emergency vehicles, cyclists, pedestrians), human health (noise, air quality, nuisance) and quality of life;
- The contribution of the Project to the increase of greenhouse gas emissions;
- Human health related to air quality, the noise environment and other nuisances, particularly because the Project is located in an area where there is an accumulation of environmental risk factors and nuisances for the health of the population;
- Conservation and protection of biodiversity, fauna, flora, special status species and habitats. Protection and recovery of species at risk, including striped bass;
- The effects of the Project on the Bay of Beauport recreational and tourism site and the activities that take place there, including swimming, boating, and wildlife observation;
- The transformation of natural and historic landscape valued by the population;
- Tourism and the transformation of natural landscapes and the historical character of Québec City;
- Cumulative effects, including those on air quality, human health, fish and fish habitat, recreational and commercial fisheries, and current uses of lands and resources for traditional purposes by First Nations;
- The process and criteria that are considered in the environmental assessment;
- Monitoring the application of mitigation and follow-up measures;
- The role of the Government of Quebec in the federal environmental assessment process.

The Agency supported public participation in the environmental assessment of the Project through its Participant Funding Program. A total of $148,417.50 was allocated to the organizations listed in Table 6.

Table 6: Funds allocated to Participant Funding Program organizations

Recipient	Amount Allocated
Accès Saint-Laurent Beauport	$14,770.00
Association des kitesurfers et véliplanchistes de Québec	$12,000.00
Comité de vigilance des activités portuaires de Québec	$16,550.00
Comité ZIP de Québec et Chaudière-Appalaches	$9,772.00
Conseil régional de l'environnement de la Capitale-Nationale	$16,550.00
Équiterre	$16,550.00
Nature Québec	$16,550.00
Organismes des bassins versants de la Capitale	$16,250.00
Stratégies Saint-Laurent	$12,875.50
Initiative citoyenne de vigilance du Port de Québec	$16,550.00
TOTAL	$148,417.50

Details of the concerns and comments raised in relation to the changes to the environment caused by the Project and the predicated effects on the valued components are listed in Chapters 4, 5 and 6. Chapter 8 summarizes the main concerns that were raised during the environmental assessment on elements that are not covered by the scope of the Project.

3.2.2 Public Involvement Activities Organized by the Proponent

The Proponent solicited the involvement of local residents, residents of Québec City, Île d'Orléans and Lévis, as well as people interested in the Project regardless of geographic location. In addition, the Proponent consulted other interested parties and those that may be affected by the Project, including industries, environmental and community groups, economic groups, municipal, provincial and federal governments, First Nations, corporations and various committees.

Since 2012, the public consultation, engagement and communication activities organized by the Proponent include the community relations committee (comité de cohabitation port), Baie de Beauport users forum, open houses, news media, an information booklet, newsletters, citizen information day, a phone line and an email address dedicated to the Project. The Proponent held individual meetings with 134 interested parties, including groups or stakeholders, as well as a plenary meeting with elected municipal officials from Québec City. Finally, following the public and Indigenous consultations conducted by the Agency on the draft report, the Proponent held meetings with organizations, municipal councillors and members of Parliament representing the citizens of the neighbouring districts in order to gather their concerns. Finally, following the public and Indigenous consultations conducted by the Agency on the draft report, the proponent held meetings with organizations, municipal councillors and members of Parliament representing the citizens of the neighbouring districts in order to gather their concerns.

3.3 Participation of Federal Government Experts

Pursuant to section 20 of CEAA 2012, federal authorities in possession of specialist or expert information or knowledge with respect to the designated Project provided advice in relation to the draft Environmental Impact Statement Guidelines, the Proponent's Environmental Impact Statement and the Proponent's responses to information requests from the Agency. The federal authorities also submitted comments and observations for the preparation of this report and potential conditions that will support the Minister's decision.

The following federal authorities provided advice at each stage of the environmental assessment process by providing expertise and knowledge relevant to the Project based on their area of jurisdiction.

- Fisheries and Oceans Canada: fish and fish habitat[12] including aquatic species at risk as well as regulatory provisions under the *Fisheries Act* and the *Species at Risk Act;*
- Environment and Climate Change Canada: weather and climate, air quality and greenhouse gases, quality of surface water and groundwater, soil and sediment quality, hydrodynamic conditions, accidents and malfunctions, migratory birds; species at risk (other than fish and marine mammals), application of the Federal Policy on Wetland Conservation and regulatory responsibilities under the *Canadian Environmental Protection Act*, the *Migratory Birds Convention Act, 1994*, the *Species at Risk Act*, and subsection 36(3) of the *Fisheries Act;*
- Natural Resources Canada: Hydrogeology, geological features, seismic movements, and regulatory and statutory responsibilities under the *Explosives Act* and *Explosives Regulations;*
- Transport Canada: Marine and rail transportation safety, navigation protection, ballast water management, prevention of marine incidents, and response readiness in the event of a marine incident (environmental emergency), as well as regulatory and legal responsibilities under the *Navigation Protection Act* and the *Shipping Act;*
- Health Canada: the Project's potential health risks induced by changes to air quality, noise disturbances, water quality and accidents and malfunctions;
- Parks Canada: Archaeological resources located on federal port lands and waters;
- Laurentian Pilotage Authority: marine traffic and pilotage services in the St. Lawrence and Saguenay Rivers, as well as regulatory and legal responsibilities under the *Pilotage Act.*

3.4 Participation of Government of Quebec Experts

The Project was not submitted for a provincial environmental assessment but is the subject of a Canada – Quebec Agreement on Environmental Assessment Cooperation between the Agency and Quebec's Ministère de l'Environnement et de la Lutte contre les changements climatiques (MELCC) for port expansion projects currently being assessed by the Agency. The agreement provides for the Government of Quebec's participation in the federal environmental assessment of the Project. The MELCC's environmental assessment experts participate in the environmental assessment technical committee by sharing their concerns and comments, as well as the advices of Government of Quebec experts. The Government of Quebec's areas of expertise presented in Table 7 are incorporated at each step of the federal environmental assessment.

[12] Definition of fish under the *Fisheries Act*: 2(1)(a) Fish includes parts of fish; b) shellfish, crustaceans, marine animals and any parts of shellfish, crustaceans or marine animals, (c) the eggs, sperm, spawn, larvae, spat and juvenile stages of fish, shellfish, crustaceans and marine animals (*poissons*) Fish and fish habitat: as defined in the *Fisheries Act.*

Table 7: Expertise of the ministère de l'Environnement et de la Lutte contre les changements climatiques du Québec and other Quebec departments consulted

Area	Expertise
Biological Environment	• Vegetation and Wetland Resources • Wildlife and Wildlife Habitat • Birds and Bird Habitat • Mammals • Special-status Species • Alien Invasive Species
Physical Environment	• Air Quality and Noise • Surface and Groundwater Quality • Sediment Quality • Soil Quality • Hydrogeology and Hydrodynamics • Sedimentology
Human Environment	• Lands and Resource Use • Public Health (noise, air quality, odours) • Archaeological Heritage on Land and Underwater • Built Heritage Resources and Cultural Heritage Landscapes
Technological Risks and Emergency Measures	• Management of Health, Safety and the Environment • Management of Technological Risks and Emergency Measures

4. Project Justification and Alternatives Considered

4.1 Purpose of the Project

The Proponent proposes a 15-metre-deep terminal to accommodate large vessels (13,100 TEU) that cannot currently dock in St. Lawrence River ports (Englobe, 2020i). To achieve its objectives, the Proponent states that the port must acquire new infrastructure, while generating sufficient revenues to maintain its existing infrastructure. It states that the port has reached the limits of its capacity since its land is fully occupied and its terminals are used to their full capacity. The Proponent believes that, due to the optimization of the Project and the partnership with Hutchison Ports and CN, the expansion of the Port of Québec would help take full advantage of the assets of the St. Lawrence trade corridor and Canada's international trade opportunities (Englobe, 2020a). In terms of job creation, the Proponent estimates that 3,010 direct and 2,327 indirect jobs would be generated during the construction phase and 457 direct and 316 indirect jobs during the operational phase. The direct and indirect value added[13] would amount to $450.6 million for Quebec and $525.9 million for Canada during the construction phase, and a total of $86.3 million annually during the operational phase.

The Ministère des Transports du Québec (MTQ) considers, in their final analysis, that the Proponent's arguments adequately demonstrate the possible economic benefits of the Project and the competitive advantages of the port, particularly in terms of strategic location (proximity to the American Midwest), competitiveness with Est Coast ports (New York, Virginia and Baltimore), market share available and organization of the supply chain. According to the MTQ, the Project's ambitions remain justifiable and plausible, although they are mainly based on hypothetical and qualitative criteria.

First Nations and the public have raised concerns about the Project's justification, its rationale and the environmental effects of the Proponent's chosen solution. In addition, the issue of the economic viability of the Project and competition with the United States east coast ports and other Canadian ports was also raised by the public.

[13] Vale added is a measure of the net output of an industry. Value added is essentially the difference between total income and the sum of production expenditures (materials, intermediate, services, etc.). Once all intermediate inputs (intermediate consumer goods and services needed to produce the good or service) are subtracted, the value added to the economy (GDP) by the activities of the industry is obtained.

4.2 Project Alternatives

Under CEAA 2012, the environmental assessment of a project shall consider the technically and economically achievable alternatives and their environmental effects.

The Location

Fisheries and Oceans Canada considers that important habitats for several fish species, including already sensitive populations, would be affected by the Project. The Project risks to destroy a striped bass spawning ground, an endangered specie under the *Species at Risk Act*, feeding and movement areas for lake sturgeon and Atlantic sturgeon and a gathering area for American shad reproduction. According to Fisheries and Oceans Canada, it would be extremely difficult to identify offset projects to mitigate these losses.

Since 2015, Fisheries and Oceans Canada, the Ministère des Forêts, de la Faune et des Parcs du Québec and the Agency have informed the Proponent on the risks of significant effects on fish and fish habitat associated with the location chosen to carry out the Project. The Proponent was asked to examine other sites for the Project that would have less consequences on fish and fish habitat, particularly striped bass. In response to these requests, the Proponent maintains that the Beauport sector is the only possible location to carry out its Project.

The Proponent emphasizes that the carrying out of the Project cannot be considered outside the limits of the lands it administers. Although the Québec Port Authority is an autonomous entity, its powers remain limited and governed by letters patent. Moreover, it is Transport Canada that determines the sites entrusted to the Proponent for management. The Proponent also maintains that the carrying out of the Project outside its properties would render impossible any intermodal link, centralization of operations and synergy with the Port's current activities. According to the Proponent, these factors would impose constraints on the Project which, combined with the acquisition process, would compromise the Project's feasibility or timeline.

Thus, three locations (Figure 6) within the limits of the lands managed by the Québec Port Authority were the object of a multicriteria analysis to determine the optimum site from the technical, economic, environmental and social point of view. It should be noted that the Estuary sector, shown in Figure 6, was not considered in the multi-criterion analysis due to the lack of space resulting from the presence of active users and the impossibility of demonstrating economic and technical feasibility.

The locations studied are (Englobe, 2020d):

- Estuary sector;
- Beauport sector;
- Lévis – Pointe De La Martinière sector; and
- Anse au Foulon sector (Figure 6).
- Following this analysis, the Proponent concludes that the location that represents the best overall performance is the Beauport sector.

Regarding the environmental criteria, the Proponent considers that the Beauport sector is the one that minimizes the losses and disturbances for the aquatic environment, in particular because the Anse au Foulon et Lévis – Pointe De La Martinière sites involve a much higher volume of dredging. However, the Agency notes that the analysis does not account for the relative quality of the habitats (aquatic and terrestrial) that would be disturbed by each of the options presented by the Proponent. Fisheries and Oceans Canada further considers that the Project would affect important habitats for several fish species, particularly a spawning area for the striped bass, an endangered species according to the *Species at Risk Act*, the lake sturgeon, the Atlantic sturgeon and the American shad. According to Environment and Climate Change Canada, the description of the species at risk should have been reviewed and improved for each site to better assess its significance. The relative weight of each species in the comparison between the sites should have been adjusted to account for its status and its abundance and range. Many First Nations raised the importance of the study area for certain ecological functions of fish and fish habitat.

Regarding the technical and economic criteria, the Beauport sector would offer advantages due to the lower construction cost and the possibility of taking advantage of the developments already in place. From a technical point of view, the topography of the Beauport sector would offer the advantage of being the same as that of the future wharf. According to the Proponent, this aspect would facilitate the development of the area behind the wharf and optimize operation of the intermodal terminal. This same topographical aspect would facilitate access to the site and land transportation of containerized cargo, unlike the Anse au Foulon and Lévis – Pointe De La Martinère sites, where significant technical challenges would have to be overcome to ensure access to the site, resulting in significant costs. On the other hand, the Beauport sector offers the advantages of intermodality for marine operators who would already benefit from a marshalling yard, as well as the road network and the railway tracks serving the Port of Québec sector. Other flexibility and complementarity criteria in terms of handling and storage areas for containerized and non-containerized cargo, as well as solid bulk and liquid bulk cargo, add to the Beauport sector's advantages for the development of the new terminal. Contrary to the sites of Anse au Foulon and Lévis – Pointe De La Martinière, the selection of the Beauport sector would favour centralization of operations and complementarity of the current activities of the Port and those projected for the new terminal.

The Proponent points out that the Beauport site nonetheless could generate high costs for the design and development of offset projects, particularly due to the presence of species at risk. Fisheries and Oceans Canada also reminded the Proponent that the costs of the offset measures can be considerable, in view of the magnitude of the surfaces concerned, the habitat functions affected and the complexity of carrying out the projects. The Agency notes that little information is provided by the Proponent concerning the environmental costs generated by this location in terms of offset, monitoring and surveillance projects.

Concerning the social criterion, the Beauport site presents a greater distance between the residences and the Projected infrastructures than the sites of Anse au Foulon and Lévis – Pointe De La Martinière. According to the Proponent, this choice would limit the potential effects of the Project on the human environment in terms of air quality and the noise environment, among others (Englobe, 2020d). The concentrations of certain air pollutants in the Port of Québec area approach or sometimes exceed Canadian ambient air quality standards (CAAQS) and this situation is cause for concern for Health Canada. Given the importance of the existing industrial activities in the sector, as well as dust emissions and the increase in road and railway

transportation outside the Port's limits, the social and psychological impacts on an already vulnerable population inhabiting the nearby neighbourhoods prove to be a major issue.

The public raised concerns about the choices of locations studied by the Proponent and proposed to examine the possibility of acquiring new lands and carrying out the Project farther downstream to reduce the effects on the natural and human environment. In this regard, the public expressed concerns about the pressure exerted by the Project on the neighbouring community, where the population's living conditions and health are considered at risk, and by the impacts on Baie de Beauport, especially on recreational and tourism activities such as kite surfing, windsurfing and light sail.

Figure 6: Potential studied locations for project realization

Englobe, 2018b

The Ministère de l'Environnement et de la Lutte contre les changements climatiques' report deplores that no variant of port expansion without major encroachment in the aquatic environment has been presented. An option to avoid backfilling in the watercourse for storage of goods would have been required. Adding such a variant to the analysis would have provided a better understanding of its advantages and disadvantages compared to the chosen option.

Berth Development

Three solutions for the orientation and configuration of the new wharf were evaluated (Englobe, 2018b):

1. 0 degree relative to the current wharf line
2. 12 degrees relative to the current wharf line
3. 17 degrees relative to the current wharf line

An orientation of 17 degrees was chosen for navigation and mooring safety reasons, and to limit the effect of the direct impacts of ice fields borne by the ebb tides on the future wharf (Englobe, 2018). According to the Proponent, this option would reduce the encroachment on the seabed compared to the other options. In economic terms, the chosen solution would involve a lower construction and offset cost.

Wharf Construction Methods

Three wharf construction solutions were considered (Englobe, 2018b):

1. Circular steel sheet pile cells
2. Concrete slabs supported on steel piles
3. Reinforced concrete caissons

The reinforced concrete caisson option was chosen because this structure would better withstand ice and shocks by vessels and would have greater longevity and lower maintenance costs than the other two options. These factors would also reduce the interventions in the aquatic environment.

Caisson Construction Methods

Three solutions for manufacturing of reinforced concrete caissons were considered (Englobe, 2018b):

1. Drydock method
2. Launching ramp
3. Submersible barge

The submersible barge was chosen because it would be facilitated by the depth of the water, adapted to this type of work. The temporary floating equipment would not necessitate provisional construction on the site and would have few potential effects on the river environment. Moreover, the cost of use of a submersible barge would be lower than the costs for the other two options considered.

Manoeuvring and Mooring Area

Three solutions for the manoeuvring and mooring area were considered (Englobe, 2020a):

1. 2007 concept (area of 166,055 square metres)
2. 2015 concept (area of 132,120 square metres)
3. Optimized concept (area of 72,085 square metres)

The optimized concept was chosen because it causes less disturbance of the aquatic environment, while ensuring the safety of the ship manoeuvring and mooring area. The optimized solution would involve a smaller area to be dredged and a lower volume of sediments to manage than the other two solutions. Consequently, the deterioration of the fish habitat, the potential effect on species at risk, the offset cost and the nuisances related to dredging operations would be less.

Dredging Methods

Three solutions for the dredging method were considered (Englobe, 2018b):

1. Mechanical dredging
2. Hydraulic dredging
3. Reliance on both dredging methods

The mixed method was chosen because it would limit the effect on the fish habitat due to the duration of the work, as well as resuspension of sediments, both of which would be limited. The hydraulic dredge is anticipated for non-contaminated sediments, while the mechanical grab dredge would be used for the sectors with contaminated sediments, when the compactness of the sediments is high or when there are large-diameter rocks on the seabed.

Management of Non-contaminated Sediments

Two solutions for management of non-contaminated sediments were considered (Englobe, 2018b):

1. On-site reclamation (sub-base of the area behind the wharf)
2. Off-site disposal

The first solution was chosen because the majority of the dredged sand would have an adequate gradation. Moreover, this solution involves a lower management cost and less impact than the off-site option. Because there would be no off-site transportation by truck, the on-site reclamation option would also involve a reduction of air pollutants, dust and noise.

Management of Contaminated Sediments

Three solutions for management of contaminated sediments were considered (Englobe, 2018b):

1. Impervious geotextile (geotube) dike
2. Dewatering pond for contaminated sediments and their use in a cement matrix
3. Dewatering pond for contaminated sediments and their off-site disposal

The third solution was chosen because it does not present uncertainties and because the sediments cannot be reclaimed. The risks of contamination of the biological environment would be lower than for the first two options.

Extension of the Ville de Québec Emergency Outfall

Two solutions for the extension of the Ville de Québec emergency outfall were considered (Englobe, 2018b):

1. Short route connecting to the facade of the new wharf
2. Route bypassing the new wharf

The Proponent chose the first option because it allows maintenance of the current direction of the pipe and because its construction cost would be lower than the route bypassing the new wharf. There would be no environmental or social advantages between the two proposed solutions.

Extension of the Railway Right of Way

Three solutions for the extension of the railway right of way were considered (Englobe, 2020a):

1. South of Boulevard Henri-Bourassa
2. North of Boulevard Henri-Bourassa (2018 version)
3. North of Boulevard Henri-Bourassa (2020 version)

The Proponent chose the third option due to the partnership with CN. This option makes it possible to keep the Beauport marshalling yard operational for the other users and keep the train manoeuvres as far as possible from the residences.

Visual and Acoustic Screen

Three solutions for the visual and acoustic screen were considered (Englobe, 2018b):

1. Vegetated embankment
2. Container wall
3. Concrete wall

The Proponent chose the second solution because it would allow optimization of the work and storage area of the container terminal due to a narrower width (three metres) compared to the vegetated embankment (20 metres) and offers better potential for use and integration for recreational purposes compared to the concrete wall. However, the construction cost of the container wall would be higher than for the vegetated embankment, but less than for the concrete wall. Concerning the visual and acoustic screen, the public raised concerns in relation to the options analysis and the justification of the container wall solution in the context of the Baie de Beauport Users Forum.

The Agency's Analysis and Conclusion

For each of the Project's key components, the Proponent described the technically and economically achievable alternatives and identified their environmental effects. The Proponent's assessment considered the profitability, technical applicability and reliability of the options and the effects on the valued environmental components selected, effects on selected valued components and input from Indigenous communities. Based on its review of the analysis, the Agency is of the opinion that the Proponent has sufficiently assessed feasible alternatives to the Project for the purposes of the environmental effects assessment under CEAA 2012.

5. Predicted Effects on Valued Components

5.1 Air Quality

Although the direct project contributions would be small, the Agency is of the opinion that the Project is likely to cause significant residual adverse environmental effects on air quality given that it would contribute to the degradation of air quality in an area where it is already a human health issue. These impacts could be expected to decline over time with the implementation of recently announced regional air quality measures.

During the construction phase, the Project would emit total particulate matter (TPM) into the air, nitrogen dioxide and formaldehyde in excess of applicable standards or criteria. Exceedances would also be observed for fine particles matter ($PM_{2.5}$) and nickel. The exceedance zones would mainly reach the Beauport recreational area, the Domaine de Maizerets or the St. Lawrence River. For certain contaminants, in particular nitrogen dioxide and total particles (TPM), they would reach other sectors of interest including residential areas in the borough of La Cité-Limoilou a few days a year.

During the operational phase, the Project would emit nitrogen dioxide and acetaldehyde in excess of the applicable standards or criteria, while contributing to exceedances for total particulate matter (TPM), fine particulate matter ($PM_{2.5}$) and nickel in the air. As for the construction phase, the exceedances would mainly concern the Beauport recreational area, the Domaine de Maizerets or the St. Lawrence River. Exceedances for nitrogen dioxide would nevertheless be observable in residential neighbourhoods a few days a year. Particulate matter emissions and contaminants would result from the use of fossil fuels during both the construction and operational phases, while transportation and handling of granular materials, as well as excavation and backfilling activities, would be added during the construction phase. Nickel exceedances would also be observed. Since the reference values for some contaminants are already high, the Agency concludes that exceedances of standards and criteria are to be expected a few days per year and are likely to have a negative effect on air quality and human health (Section 5.7) despite the limited contribution of the Project itself.

This section describes the effects of the Project on air quality. The effects of the Project on human health, including those related to air quality, are discussed in Section 5.7. Transboundary effects, in this case greenhouse gas emissions, are discussed in Section 5.2. The following subsections present the information considered by the Agency in its analysis to conclude on the significance of the Project's effects on air quality, including the opinions and comments of the expert departments, First Nations consulted and the public.

5.1.1 Description of the Component "Air Quality"

This section deals with changes in the atmospheric environment caused in particular by the emission of major contaminants, including particulate matter (total particulate matter (TPM), inhalable particulate matter (PM_{10}), and fine particulate matter ($PM_{2.5}$), organic compounds, metals, gaseous contaminants, dust deposition and odour emissions (Englobe, 2020c).

The study area selected by the Proponent to assess the effects of the Project on air quality is the airshed zone (Figure 3, Chapter 1). This zone would take into account an area of high environmental and social concern. It is defined by a six-kilometre radius around the Project's focal point (Englobe, 2020c). The study area encompasses productive (e.g., Beauport flats, Beauport River), used (e.g., Baie de Beauport beach, St. Lawrence River, marinas, public spaces, cruise ships area) and inhabited (Québec City and Lévis neighbourhoods) environments.

The effects of the Project on air quality and, consequently, on human health are among the main concerns raised by the public during the environmental assessment process. Residents of the borough of La Cité-Limoilou borough are particularly concerned about the Project. These concerns are also shared by government authorities with expertise related to air quality (Environment and Climate Change Canada, Ministère de l'Environnement et de la Lutte contre les changements climatiques) and human health (Health Canada), because the Project is part of a living environment that is already under considerable pressure on air quality.

The public, and more specifically residents of the borough of La Cité-Limoilou, requested during the environmental analysis that the effects of road and rail transportation related to the Project, but which would take place outside the limits of the Proponent's territory (transportation of containers by truck and train to their destinations), be taken into account in the environmental analysis. These concerns were exacerbated when the Proponent announced, in December 2017, that the Project was changing its vocation from a multipurpose terminal to a container terminal, thereby generating greater trucks traffic and longer trains in the borough of La Cité-Limoilou. In light of these concerns, the Agency asked the Proponent, pursuant to paragraph 19(1)(j) of CEAA 2012, to provide information on the effects of emissions from rail and road transportation generated by the Project and which would take place outside the limits of the Port of Québec in the borough of La Cité-Limoilou. In response to this request, the Proponent decided to include emissions from this transportation in its analysis without distinguishing them from direct emissions from the Project (Englobe, 2020c). In its recent documentation, the Proponent emphasizes that the rail convoys linked to the Project would replace the convoys which currently pass on this railway line. Thus, the number of convoys would not increase with the Project, but they would be longer. The results would therefore not only represent the rail emissions related to the Project, but also consider existing emissions (Québec Port Authority, 2020).

Ambient Air Description

To describe the baseline ambient air condition, the Proponent relied on data collected at various sampling stations throughout the airshed area. Thus, 42 contaminants were considered during sampling periods, generally between 2010 and 2017, at nine distinct stations. Of these nine stations, six were installed by the

Ministère de l'Environnement et de la Lutte contre les changements climatiques (MELCC) (Vieux-Limoilou, Beaujeu, De Vitré, Beaucage, Saint-Charles Garnier and Georges-Maranda in Lévis) while the three others belong to the Proponent (2nd, 3rd and 8th Avenue) (Englobe, 2020c).

The Proponent compared the data from the sampling stations to the standards of the *Règlement sur l'assainissement de l'atmosphère* (RAA) and the Canadian Council of Ministers of the Environment's Canadian Ambient Air Quality Standards 2020 and 2025 (CAAQS). Based on a detailed analysis of the nine stations, several exceedances of the RAA and CAAQS standards and criteria (2020 and 2025) are observed. Nickel, total particulate matter (TPM) and fine particulate matter ($PM_{2.5}$) are repeatedly exceeded at several stations. The Proponent has paid particular attention to these contaminants, which are of concern to the public and government authorities (Englobe, 2020c).

Total Particulate Matter (TPM)

Concentrations for total particulate matter (TPM) show exceedances of the RAA standards at six of the seven stations measuring this type of air contaminant. The most frequent exceeding are at the Vitrée station (7% of the time). According to the Proponent, the sources contributing to these emissions are wood burning, transportation and industrial activities. The Proponent points out that, based on a recent judgment[14], the contribution of Port of Québec activities to the dust found by the citizens of the borough of La Cité-Limoilou would be negligible, particularly since the implementation of measures to reduce dust emissions (Englobe, 2020c). The judgment is currently under appeal. The Initiative citoyenne de vigilance du port de Québec considers it premature to draw any conclusions.

For dust deposition, the Proponent compared the data with the RAA standard, established at 120 g/m3 over a 24-hour period (TPM). This standard is determined, among other things, to limit nuisance problems and effects on visibility (Fisheries and Oceans Canada, 1976 in Walsh and Brière 2018). Total particulate matter (TPM) is less likely to cause health effects because it consists largely of coarse particles that penetrate less deeply into the respiratory tract. However, these particles can cause allergic or irritating effects (Walsh and Brière 2018).

Fine Particulate Matter ($PM_{2.5}$)

For fine particulate matter ($PM_{2.5}$), four out of six stations show exceedances of the RAA or CAAQS[15] standards and criteria, i.e., 27 micrograms per cubic metre (µg/m^3) over a daily period and 8.8 µg/m3 over an annual period. The station with the highest frequency of exceeding (2% of the time) is the Vieux-Limoilou station.

[14] Judgment of March 4, 2020, in the case of Véronique Lalande and Louis Duchesne against Compagnie d'Arrimage de Québec Ltée and l'Administration portuaire de Québec (No. 200-06-000169-139)

[15] The CAAQS include four colour-coded levels of management, coupled with a series of progressively more rigorous monitoring, reporting and management measures as air contaminant concentrations approach or exceed the CAAQS. These management levels ensure that the CAAQS are not seen as levels up to which one can pollute.

The emission sources for these particles would be the same as for total particulate matter (TPM). However, fine particles matter ($PM_{2.5}$) settle more slowly and can be moved over greater distances. Thus, according to the Proponent, they could come from as far away as the U.S. Midwestern United States, Southern Ontario and the East Coast of the United States (Englobe, 2020c).

According to a study carried out by the Direction de la Santé publique in 2019 (Direction de la Santé publique de la Capitale-Nationale du Québec, 2019), wood heating would be the main source of particulate emissions ($PM_{2.5}$ and PM_{10}) on the Local Community Services Centres (CLSC) Limoilou-Vanier and Basse-Ville territories. The decrease observed for these particles over the years is mainly due to the gradual phase-out of wood heating and the replacement of fireplaces by more efficient heating systems.

Nickel and Other Metals

Nickel concentrations exceed the RAA standard for all analyzed stations. The Proponent indicates that the emission of nickel particulate matter is a known issue that is present in the airshed area. It is at the Vitré station that the most exceedings are observed (60.7% of the time) (Englobe, 2020c). According to Walsh (2018), the origin of the nickel was established in 2013 and would have come from the transhipment of ore concentrate at the Port of Québec. According to the Proponent, this observation must, however, be put into perspective with the actions implemented in the port's territory over the last few years. The continuous improvement of transhipment operations, the optimization of the equipment used and the implementation of mitigation measures would have effectively reduced nickel emissions (Englobe, 2020c). According to the Direction de santé publique, the situation does indeed seem to have improved in recent years (Direction de santé publique, 2018).

Some air sampling stations also show exceedances for other metals, including arsenic, copper, manganese and zinc. High concentrations of metals in the air are believed to result from industrial operations, including Québec City's incinerator, and dust generation from road and rail transport (Englobe, 2020c).

Other Contaminants

Stations measuring nitrogen dioxide (NO_2) and ozone show exceedances. Nitrogen dioxide (NO_2) is a precursor to the formation of ozone in combination with volatile organic compounds (VOCs). However, no stations report concentrations of volatile organic compounds (VOCs). Although, according to *National Pollutant Release Inventory* (NPRI) data, several industries report emissions of volatile organic compounds (VOCs). Like fine particulate matter ($PM_{2.5}$), ozone can be transported over long distances and it is possible that sources outside the airshed area may contribute to the degradation of ambient air quality (Englobe 2020c).

Odours

No odour baseline conditions were submitted by the Proponent.

General Observations on Ambient Air Quality

The airshed area, including the borough of La Cité-Limoilou, already has loaded baseline conditions for contaminants. According to the Proponent, any addition of contaminants could result in the standards or criteria being exceeded. It is aware that its Project will make a non-zero contribution to the already degraded baseline conditions (Englobe 2020c).

According to Walsh's report (2018), the air quality in the borough of La Cité-Limoilou is representative of an urbanized environment and, in general, the standards and criteria for air quality are respected. The annual average concentrations of contaminants meet the reference thresholds for all contaminants except nickel. However, exceedances are observed for certain daily standards such as total particulate matter (TPM), fine particulate matter ($PM_{2.5}$) and, to a greater extent, nickel. The main sources responsible for the contaminant concentrations measured at the stations would be road transportation, fossil fuels and wood heating, to which would be added, for certain contaminants, industrial and port activities (Walsh and Brière, 2018).

The data collected at the Vieux-Limoilou station is of greater concern to the Direction de la santé publique de la Capitale-Nationale du Québec. This station is located 2.5 km southwest of the Project center and was selected to establish initial values for several contaminants as part of the air emission modelling for the Project. According to the report by the Direction de la santé publique de la Capitale-Nationale du Québec (2019), air quality problems in the vicinity of this station are a priority because residents and people frequenting the neighbourhood have significant exposure to pollutants in a context where the health of residents is poorer than in other neighbourhoods in Québec City and where environmental and socio-economic risks are cumulative. According to this report, the average concentrations of fine particulate matter ($PM_{2.5}$) and nitrogen dioxide are higher than at the other sampling stations. Exceedances of fine particulate matter ($PM_{2.5}$) at the annual MELCC criteria are also recorded. Exceedances of daily reference values for total particulate matter (TPM) and fine particulate matter ($PM_{2.5}$) are also more frequent at the Vieux-Limoilou station than at other air quality measurement stations in the region. Finally, exceedances of reference values are observed for inhalable particles matter (PM_{10}) (annual and daily), ozone (1 and 8 hours), sulphur dioxide (SO_2) (daily), arsenic (annual) and nickel (daily) (Englobe 2020c).

Since air quality is an issue for the central neighbourhoods of Québec City, the Direction de la santé publique de la Capitale-Nationale du Québec (DRSP-CN) created the Comité intersectoriel sur la contamination environnementale dans l'arrondissement La Cité-Limoilou (CICEL), which brings together organizations, authorities and public and private bodies in order to implement measures to reduce concentrations of certain fine particles in the ambient air. The Proponent is one of the members of this committee (Englobe, 2020y). The efforts invested by CICEL members have contributed to the improvement of the air in the Limoilou-Vanier-Basse-Ville territory in recent years.

Finally, in its *Bilan initial de la qualité de l'air extérieur et ses effets* (DRSP, 2019), the DRSP-CN recognizes that, overall, air quality in the Limoilou-Vanier-Basse-Ville area has improved since 2013. Nevertheless, it considers that any new project must not contribute to an increase in the concentrations of contaminants in the environment.

5.1.2 Analysis of Potential Effects and Proposed Mitigation Measures

The Proponent used the U.S. Environmental Protection Agency (EPA) dispersion model to predict how emissions from stationary and mobile sources during the construction and operational phases of the Project would disperse within the airshed area (Englobe 2020c). According to Environment and Climate Change Canada, this methodology generally meets the criteria set out in the Ministère de l'Environnement et de la Lutte contre les changements climatiques (MELCC) *Air Quality Dispersion Modelling Guidelines*[16] for most of the model input data.

The dispersion study considered criteria air contaminants (CACs) including nitrogen dioxide (NO_2), carbon monoxide (CO), sulphur dioxide (SO_2), ammonia (NH_3) and particulate matter (TPM, PM_{10} and $PM_{2.5}$). It has also addressed some toxic contaminants including diesel particulate matter and volatile organic compounds (VOCs) such as formaldehyde, metals and polycyclic aromatic hydrocarbons (PAHs) (Englobe, 2020c).

Lastly, the Proponent took into account the presence of air contaminants already present in the environment by adding initial concentrations to the atmospheric dispersion model to determine the effect of the Project on air quality. These initial concentrations were derived in particular from measurements taken at the Vieux-Limoilou sampling station. Data for sulphur dioxide (SO_2), nitrogen dioxide (NO_2), fine particulate matter ($PM_{2.5}$), inhalable particulate matter (PM_{10}) and total particulate matter (TPM) from the years 2014 to 2016 were used. For other contaminants, where available, initial concentrations were taken from Schedule K of the *Règlement sur l'assainissement de l'atmosphère* (RAA) or MELCC criteria. The Proponent also considered wind erosion of sediment storage ponds (including that for contaminated sediments) in the modelling study and took into account the Canadian Council of Ministers of the Environment (CCME) *Canadian Ambient Air Quality Standards*[17] (CAAQS) and criteria from the MELCC (2018) RAA for the interpretation of the results (Englobe 2020c). For diesel particulate matter, acetaldehyde and acrolein, no initial concentrations were included in the atmospheric dispersion modelling, which Health Canada believes complicates the interpretation of the results.

Atmospheric dispersion modelling was applied to a grid of 1,737 receptors corresponding to sectors of interest (La Cité-Limoilou residential sector, Baie de Beauport park and beach, Domaine de Maizerets) or sensitive receptors (hospitals, local community service centres, early childhood centres, schools, long-term care hospitals and private seniors' residences) in the study area.

According to the Proponent, the modelling is based on conservative assumptions since the scenarios chosen often represent the worst-case scenario, i.e., using the year that would emit the most particulate matter (year 2), a situation where all motorized vehicles operate at the same time and at all times, in addition to

[16] http://www.environnement.gouv.qc.ca/air/atmosphere/guide-mod-dispersion.pdf
[17] https://www.ccme.ca/fr/current_priorities/air/ncqaa.html

considering the use of so-called conservative initial concentrations and the use of conservative assumptions. These emission scenarios would thus lead to an overestimation of air emissions (Englobe, 2020c).

Environment and Climate Change Canada is of the opinion that most emission sources have been adequately described according to recognized practices. However, it is of the opinion that the Proponent has chosen optimistic scenarios. Uncertainty will remain with respect to the modelled concentrations of contaminants, particularly nitrogen dioxide (NO_2), and the extent of their dispersion. Furthermore, the Proponent considered in its modelling an 80% mitigation factor for unpaved roads, which Environment and Climate Change Canada considers too high. Despite the March 2021 submission of a technical note justifying the use of this mitigation rate (SNC-Lavalin, 2021), Environment and Climate Change Canada maintains that the modelling could underestimate the concentrations of particulate matter (TPM, PM_{10} and $PM_{2.5}$) and the rates of dust deposition.

According to them, if the phenomenon of dry deposition were taken into account, the standard on total particles (TPM) of the RAA would not be exceeded. Lastly, Environment and Climate Change Canada points out that despite the use of high mitigation rates, results still show hourly and daily exceedances. These exceedances could pose risks to sensitive receptors even if they occur over short periods. Environment and Climate Change Canada states that it is therefore important to qualify the effects described by the Proponent.

The Ministère de l'Environnement et de la Lutte contre les changements climatiques (MELCC) considers that the methodology used to carry out the atmospheric dispersion modelling is adequate. It would have liked to see emissions regarding existing activities from the Port of Québec in the Beauport sector.

It underlines that some uncertainties persist as to the sources of emissions taken into account and the emission rates used. The MELCC considers that certain elements need to be clarified, particularly for the construction phase (e.g., Information that appears contradictory on the periods for carrying out the work, validation of the emission rates, marine vehicle emissions, type of diesel fuel for locomotives, references for certain hypotheses on diesel odour detection thresholds).

Some citizen and environmental groups question the validity of the initial concentrations used for modelling, in particular because the Vieux-Limoilou measuring station would not take into account all the pollutant emissions generated by industries, in particular those from the incinerators of Québec City. Accès Saint-Laurent et le Conseil régional de l'Environnement et du développement durable – Région de la Capitale nationale (CRE-capitale nationale de Québec) doubts the validity of the scenario proposed by the Proponent, which states that 90% of the containers would be transported by train and that only 10% would be by truck. They consider, based on data from other ports in North America, that this ratio is too optimistic and that truck transport would be much higher, which would have consequences for air quality and greenhouse gas. The Projection of a maximum of 700,000 TEU is also questioned and many argue that the number of containers transshipped at the Port of Québec would be greater, which could generate more transport by train and by truck in the central districts of Québec City.

Construction Phase

The construction activities would consist of the development of structures that will require a significant amount of granular material to be transported and handled on-site over a three-year period. Only the second year was considered in the modelling, as it would represent the year when the quantities of granular material transported to the site would be the highest (Englobe, 2020c).

Table 8 presents the main substances whose maximum concentrations would cause the various standards to be exceeded during construction.

Table 8: Summary of Maximum Concentrations of Selected Ambient Air Contaminants during Terminal Construction in Year 2

Contaminant	Period	Maximum Project Contribution (A)[1]		Initial concentration (B)		Total concentration (C = A + B)[2]		Standard or criterion	
		µg/m³	% standard	µg/m3	% standard	µg/m3	% standard	µg/m3	Type
Volatile Organic Compounds (VOCs)									
Formaldehyde	15 minutes	85	228%	3	8.1%	88	237%	37	RAA[3]
1.3-butadiene	Annual	0.00041	0.14%	0.27	90%	0.3	90%	0.3	CAAQS[4]
Metals									
Arsenic	Annual	6.4 x 10^{-6}	0.21%	0.0027	90%	0.0027	90%	0.003	RAA
Nickel (PM_{10})	24 hours	0.0054	39%	0.079	564%	0.0844	603%	0.014	RAA
Particulate matter[5] and nitrogen dioxide									
$PM_{2.5}$ (80% attenuation)	24 hours	27	90%	20	67%	47	157%	30	RAA
		7.7	28%	25	93%	33	121%	27	CCAAQ(2020)
	Annual	0.56	6.3%	9.7	110%	10	117%	8.8	CCAAQ(2020)
PM_{10} (80% attenuation)	24 hours	19	31%	48	80%	67	111%	60	60[6]
PMT (80% attenuation)	24 hours	184	153%	104	87%	288	240%	120	RAA
Nitrogen Dioxide (NO_2)	1 hour	523	126%	107	26%	630	152%	414	RAA
	1 hour	204	258%	98	104%	230	291%	79	CCAAQ(2025)
	24 hours	227	110%	75	36%	302	146%	207	RAA
	Annual	9.7	9.4 %	16	16%	26	25%	103	RAA
		9.0	39%	16	70%	25	109%	23	CCAAQ(2025)

Source: Adapté de Englobe, 2020c

Note: Results in red indicate that a criterion or standard has been exceeded. Concentrations in yellow indicate concentrations that meet the criterion or standard.

(1) Maximum concentrations calculated outside the industrial zone, outside the 300 m buffer zone beyond the marine terminal on the river and inside the Baie de Beauport recreational zone over the modelling period (2008–2012).
(2) Total concentrations: Summation of the maximum concentrations for the terminal and the initial concentrations.
(3) RAA: MELCC *Règlement sur l'assainissement de l'atmosphère*
(4) CAAQS: Canadian Council of Ministers of the Environment Ambient Air Quality Standards
(5) For all PM: With mitigation measures to reduce emissions from unpaved roads at the site by 80% and emissions for loading, unloading and handling of fill by approximately 70%.
(6) Old proposed but not endorsed Canada-wide Standard: three-year average of the annual 98th percentile of daily 24-hour average concentrations.

Nitrogen Dioxide

For Nitrogen Dioxide (NO_2), the maximal concentrations modelled for the Project contribution exceed the RAA standards and CAAQS criteria for both hourly and daily periods. Maximal concentrations range from 110% to 258% of the standard or criterion depending on the period. These maximal concentrations reach up 291% when the initial concentrations are taken into account (Table 8).

The maximum frequency of exceeding the hourly and daily standards of the RAA is respectively 0.068% and 1.1% (4 days per year) of the time on an annual basis including the initial concentration for all the receptors in the field of applicability of standards. The receiver associated with the maximum frequencies is located on the St. Lawrence River. The maximum frequency of exceeding the RAA standard on an annual basis is 0.023%, all receptors combined in the recreational area. However, for the hourly CAAQS (2025), exceedances of standards are observed throughout the modelling domain since the initial concentration already exceeds the standard (Englobe, 2020c).

Particulate Matter (PM)

To calculate particulate emissions, the Proponent used a scenario without mitigation measures for emissions from traffic on unpaved roads (Case A) and a scenario with mitigation measures aimed at a mitigation rate of 80% for roads (spreading dust suppressants, watering road surfaces, etc.) and 70% for backfill transported by wagons (watering) (Case B) (SNC-Lavalin, 2020). The results show exceedances of the daily standard for all particulate matter: total particulate matter (TPM), inhalable particulate matter (PM_{10}) and fine particulate matter ($PM_{2.5}$), for both scenarios. Without mitigation measures, significant exceedances of the RAA daily standard for total particulate matter (TPM) are obtained for an area that includes the borough of La Cité-Limoilou as well as part of other boroughs in Québec City and Lévis (Map 3.7 in Englobe, 2020c), due in part to an initial concentration that is already 87% of the standard. The area of potential exceedance of the standard would be reduced with the application of mitigation measures, but would still extend to part of the borough of La Cité-Limoilou (Map 3.8 in Englobe, 2020c). Theses overruns were calculated for all sectors of interest (Limoilou District, Domaine de Maizerets, Beauport Bay recreational park) and certain sensitive receptors, with an exceeding frequency of less than 10% of the year for the recreational park and less than 2% for others (Englobe, 2020c).

The MELCC notes the exceedances of standards are also anticipated in Lévis. The Project would significantly increase the maximum daily concentrations (24 h) of total particulate matter (PMT) beyond the RAA standard, even in the presence of the planned mitigation measures.

The same trend is also observed for inhalable particles matter (PM_{10}) and fine particles ($PM_{2.5}$), for which exceedances would also be observed despite mitigation measures, but over a smaller area and more specifically at the Bay of Beauport recreational park. According to the Proponent, the highest contributions from the construction Project would occur especially during fall and winter weather conditions when the recreational tourism site is closed (Québec Port Authority, 2020).

Other Contaminants

Standards and criteria are met for most of the other substances analyzed except for nickel and formaldehyde. For nickel, whose ambient concentration already exceeds the RAA standard (564%), the Project would contribute 39% of the daily standard. For formaldehyde, maximum concentrations would reach 228% of the standard for the Project alone and 237% of the standard based on the initial concentration. These two substances are contaminants of concern for users of the Baie de Beauport recreational area.

Dust Deposits

Dust deposition was studied according to the two scenarios described above (case A, without mitigation measures and case B, including mitigation measures). The application of an 80% attenuation rate for the calculation of dust deposition would reduce the deposition due to the Project to a level slightly higher than current deposition.

Odours

During the construction phase, modelling related to diesel engine exhausts indicates odour levels above the odour threshold[18]. However, there would be no exceedances of the MELCC air quality criteria. The Proponent indicates that no information is available on the potential for odour generation in contaminated and non-contaminated sediments (Englobe, 2020c).

Proposed Mitigation Measures and Follow-up Program

Mitigation measures proposed by the Proponent during the construction phase cover transportation, traffic, management of particulate emissions, as well as excavation and backfilling activities that would take place on its territory (Englobe, 2020r).

One of the most important measures considered by the Proponent is the use of rail to import the majority of fill material instead of trucking. For Year 2 (the year used for modelling), the Proponent estimates that this measure would result in a reduction of approximately 33,500 trucks and approximately 77,000 trucks for the entire construction phase (Englobe, 2020c). Emissions from rail transportation are usually lower than those from truck transportation provided they follow the best performance standards in force.

The Proponent also proposes to apply dust suppression as often as possible and to pave the road surfaces, which would allow it to achieve an 80% reduction in particulate emissions. While watering the loaded embankment in trains would reduce particle lift by a factor of about 70%, according to the Proponent, during loading, unloading and handling. Similarly, regular cleaning and watering of the train material unloading area and the work areas near the backshore space would prevent the re-suspension of particles in the air. To

[18] The odour threshold is the lowest concentration of the substance that can be detected by a group of subjects.

reduce potential contaminant emissions during the use of the concrete plant, the proposed measures are based on the *Guide des bonnes pratiques environnementales des usines de BPE* (ABQ, 2016). The Proponent also wishes to include clauses in its contracts with contractors to reduce emissions from combustion engines by requiring the majority use of Group 4 heavy equipment and the hybridization of inter-construction trucks (Québec Port Authority, 2021).

The Proponent presented a dust management plan covering the concrete production plant and paving activities, with the objectives of controlling particulate emissions to the air, installing a meteorological station and implementing an air quality monitoring program (Englobe, 2020r).

In this documentation submitted during the public consultation (Québec Port Authority, 2020), the Proponent improved its monitoring and follow-up program. It is therefore committed to monitoring nickel, dust fallout, nitrogen dioxide, inhalable particles matter (PM_{10}) formaldehyde and acetaldehyde. A LiDAR (Light detection and ranging) system would be put in place to better control dust emissions on the site and thus allow finer detection of particle emissions to sensitive receptors. According to the Proponent, this approach would proactively target dust emissions and their causes to remedy them. Thus, hourly intervention thresholds for total and inhalable particles (PMT, PM_{10}) would be established during the work, which would allow additional mitigation measures to be put in place to limit any potential exceedance of daily standard in sensitive areas. A rigorous monitoring would be carried out by a professional responsible for monitoring particles using a portable analyzer at the limit of the full-time work site throughout the duration of the construction phase. Finally, a protocol would be prepared and would detail the process to be followed by each stakeholder when intervention thresholds are exceeded:

- The procedure for verifying the origin of the exceeding;
- Checking the effectiveness of a mitigation measure put in place following an exceeding;
- The procedure to follow for the analysis of fixes in the event that a measure mitigation would not be effective and a second threshold violation would be measured;
- Publication, on a website developed for the Project, of the concentrations of all contaminants measured daily for the monitoring carried out continuously and monthly for the other periods. Monthly communications would include an analysis with applicable standards and a comparison with previous months.

Given that the results of the dispersion study show potential exceedances of standards during the construction phase in the Beauport Bay recreational area, the Proponent undertakes to include in its monitoring program for the quality of air a continuous particle measurement station. The data from this station would thus be available to the population and in cases where the concentrations were found to be high, on-site users would be notified with a notice board (Québec Port Authority, 2020).

Environment and Climate Change Canada is of the opinion that the measures recommended in the air quality monitoring program and follow-up and the dust management plan are appropriate and should be implemented with the following recommendations in mind:

- Dust deposition should be added to the monitoring program and follow-up, at least during periods of maximum dust emission since dust deposition is a major concern for nearby residents;
- The Proponent anticipates that site management will use wind direction or weather conditions to determine whether the source potentially responsible for the exceedances is on-site or elsewhere. Environment and Climate Change Canada is of the view that this measurement lacks precision due to variability in wind direction and gust potential and recommends that a structured methodological approach be developed to support verification of the origin of particulate matter exceedances.

With respect to odours, the Proponent would pay particular attention during monitoring to odours that could generate nuisances (Englobe, 2020c). Monitoring and follow-up efforts would be integrated into the Proponent's current good practices, and a complaint-handling system would allow for the collection of potential reports.

Finally, due to anticipated exceedances of particulate matter and other contaminant concentrations and uncertainties in air emissions modelling results, Environment and Climate Change Canada believes that it is necessary to develop and implement mitigation measures to limit air emissions and minimize the potential adverse effects of the Project on air quality.

Operational Phase

Emissions from operations and equipment during the operational phase would consist mainly of gaseous contaminants from engines (equipment and marine, land and rail transportation), and fugitive emissions of dust from paved and unpaved roads. The effects would come mainly from maritime activities within the Proponent's area of jurisdiction, road transportation within the borough of La Cité-Limoilou, rail transportation (on-site and off-site), as well as from the Beauport marshalling yard and vehicle traffic inside the terminal. The modelling is based on a typical weekday operation at full capacity of the terminal.

Of the Criteria Air Contaminants (CACs) (Table 9), only nitrogen dioxides (NO_2) and particulate matter (PM) show exceedances of the standards and criteria during the operating phase. Exceedances are also observed for nickel and acetaldehyde. Some exceedances are already observed by considering only the initial concentration, which demonstrates a previously saturated baseline conditions (SNC-Lavalin, 2020).

Table 9: Summary of Maximum Criteria Air Contaminant (CAC) Concentrations Calculated in Ambient Air for Terminal Operation

Contaminants	Periods	Maximum terminal contributions (1) (2) (A)		Initial concentrations (B)		Total concentrations (C = A + B)		Guiding values	
		µg/m³	% standard	µg/m³	% standard	µg/m³	% standard	µg/m³	Standard or criteria
NO_2	1 hour	165	40%	107	26%	272	66%	414	RAA
	1 hour	92	82%	98	87%	161	142%	113	CAAQS (2020)
	1 hour	92	117%	98	124%	161	204%	79	CAAQS (2025)
	24 hours	38	18%	75	36%	113	54%	207	RAA
	Annual	8.2	7.9%	16	16%	24	23%	103	RAA
	Annual	8.0	25%	16	50%	24	75%	32	CAAQS (2020)
	Annual	8.0	35%	16	70%	24	104%	23	CAAQS (2025)
TPM	24 hours	25	21%	104	87%	129	107%	120	RAA
PM10	24 hours	2.7	4.5%	48	80%	51	84%	60	Suggested
$PM_{2.5}$	24 hours	2.1	6.9%	20	67%	22	74%	30	RAA
	24 hours	1.0	3.8%	25	93%	26	96%	27	CAAQS (2020)
	Annual	0.41	4.7%	9.7	110%	10	115%	8.8	CAAQS (2020)
Volatile Organic Compounds (VOCs)									
Acetaldehyde(3)	4 minutes	3.1	102%	n/a	n/a	3.1	102%	3	C (MELCC)
Metals									
Arsenic	Annual	3.7×10^{-6}	0.12%	0.0027	90%	0.0027	90%	0.003	(RAA)
Nickel (PM_{10})	24 hours	0.0010	6.8%	0.079	564%	0.080	571%	0.014	(RAA)

Source: Adapted from Englobe, 2020c

Note :Results in red indicate that a criterion or standard has been exceeded. Concentrations in yellow indicate concentrations that meet the criterion or standard.

(1) Maximum concentrations calculated outside the industrial zone, outside the 300 m buffer zone beyond the marine terminal on the river and inside the Baie de Beauport recreational zone over the modelling period (2008–2012).

(2) Maximum contributions are based on the static values of standards or criteria. For the RAA, these are the maximums over the entire simulation period. For the CAAQS, these are 3-year averages of annual averages or annual 98th percentiles of daily averages ($PM_{2.5}$, PM_{10}) or annual 98th percentiles of daily hourly maximums (NO_2).

(3) For this substance, there is no initial concentration to consider, the criteria correspond to the addition allowed for the Project. The 4-minute concentrations are applicable at the 99th percentile on an annual basis.

Nitrogen Dioxide

The nitrogen dioxide (NO_2) concentrations modelled for the Project (Project contribution) are below the RAA standards and above the CAAQS criteria for the hourly period in 2025. These exceedances increase for the 2025 standard and exceed the 2020 standard when the initial concentrations are added. Calculated hourly and daily nitrogen dioxide (NO_2) concentrations exceed the CAAQS for 2020 in the borough of La Cité-Limoilou and exceed the CAAQS for 2025 across the modelling domain (especially in Lévis) and even beyond (SNC-Lavalin, 2020). It should be noted, however, that the initial concentration of nitrogen dioxide already exceeds this future standard, which represents a particular challenge for the ambient environment.

The MELCC points out that the neighbourhood that would be affected is characterized by a vulnerable population and the Laurentia Project would result in nitrogen dioxide concentrations above Health Canada's guidelines. The logic would therefore be that no additional input of a pollutant whose concentrations meet or exceed air quality standards would be allowed.

According to the atmospheric dispersion study, high concentrations on an hourly basis are predicted for nitrogen dioxide near the industrial zone. They are likely caused by ships at berth, in motion and by container handling. There are also high hourly maximums near the industrial zone, at the Domaine de Maizerets, in the recreation and tourism zone of the Bay of Beauport, as well as along the railway line that crosses La Cité-Limoilou (and possibly also in other areas of the city crossed by it). Consequently, the MELCC considers that reductions in current emissions are necessary to address this problem. One of the main sources of nitrogen dioxide emissions would be the locomotive. However, according to the MELCC, the locomotive engine replacement program should lead, within a few years, to a substantial reduction in emissions from the railway sector.

Particulate Matter (PM)

Total TPM particulate matter concentrations show an exceedance of the daily RAA standards. These exceedances would be observed at the Baie de Beauport Recreational Park where the modelled daily concentration of fine particles ($PM_{2.5}$) is close to the CAAQS criteria for 2020. At the annual level, the concentration of fine particles ($PM_{2.5}$) exceeds the CAAQS standard for 2020 due to high initial concentrations. Exceedances cover the entire airshed area, including all areas of interest and sensitive receptors. Annual concentrations of diesel particulate matter are highest near the site. Results show exceedances for daily and annual periods for total particulate matter (TPM) at the RAA and for fine particulate matter ($PM_{2.5}$) at the CAAQS for 2025. Fine particulate matter ($PM_{2.5}$) emissions are also very close to the CAAQS criteria for 2020.

Considering that the sector is "saturated" with fine particles ($PM_{2.5}$), the MELCC is of the opinion that no additional additions should be allowed. Exceeding these standards could, among other things, contribute to increasing the intensity and duration of smog episodes.

In this regard, the MELCC considers that the Proponent should ensure that its current facilities further reduce their air emissions. It should also demonstrate efforts to reduce the emissions of fine particulate matter

($PM_{2.5}$) from its Project. For example, the modernization of locomotives and the electrification of its facilities would reduce fine particulate matter emissions and greatly improve the situation.

Other Contaminants

MELCC criteria are met for most volatile organic compounds (VOCs) with the exception of acetaldehyde, which reaches 102% of the RAA standards in the absence of initial concentration (SNC-Lavalin, 2020). This exceedance would be observed at the edge of the site, i.e., in the industrial zone along the railway line. Environment and Climate Change Canada notes that the estimate of the initial concentration of acetaldehyde in Québec City is higher than the emissions from the Project and could reach 700% to nearly 1200% of the standard.

Metal-related standards and criteria are met for most substances except for nickel, whose ambient concentration is 564% of the RAA standard, with the Project contributing 6.8% of the daily standard. The MELCC considers that a significant portion of high ambient nickel concentration is attributable to activities currently taking place at the Port of Québec site (Walsh et Brière, 2013) and is particularly concerned about the modelled nickel concentrations.

On March 30, 2021, the Government of Quebec announced that it will soon introduce a draft regulation to adjust the nickel standard. The proposed changes would increase the daily nickel standard (14 nanograms per cubic metre) to 70 nanograms per cubic metre (ng/m^3), plus an annual standard of 20 ng/m^3. However, the MELCC believes its conclusions regarding project compliance would remain unchanged despite the possible adoption of the proposed nickel standards. Indeed, the atmospheric concentrations already present in the media also exceed the proposed standard of 70 ng/m^3 over 24 hours. It considers that, for the Project to be acceptable, measures should be put in place to avoid a net increase in nickel emissions into the ambient air in Québec City.

The MELCC states that the most recent data on nickel concentrations measured at the Vieux-Limoilou station still show exceedances of the proposed 24-hour standard. Although the frequency of exceedance of the new standard would be reduced compared to the current standard, it would still be 3.5% in 2019 and 2.4% in 2020. The maximum concentrations measured at the Vieux-Limoilou station then reached 183 ng/m^3 (2019) and 194 ng/m^3 (2020).

The Agency's analysis and conclusions, based on advice from Environment and Climate Change Canada, Health Canada and MELCC, takes into account the standards in effect at the time of the environmental assessment.

For arsenic, although there is no anticipated exceedance, the initial concentration is 90% of the RAA standard and the Project's contribution would be 0.12% of the standard (SNC-Lavalin, 2020). The curves in SNC-Lavalin's Map 4.15 (2020) indicate that the highest concentrations are along the railway platform and infrastructure and decrease rapidly beyond these limits.

Dust Deposits

The results for the operational phase indicate that the movement of vehicles on the roads would cause the majority of the dust fallout and would represent only a small part of the current deposition (initial state). The maximum quantities of these deposits would be located on the Project site, on Charest and Henri-Bourassa boulevards and on the Dufferin-Montmorency highway (SNC-Lavalin, 2020). The results were obtained without the application of a mitigation rate that is generally in the order of 5%-10% of emissions in the best case (according to US EPA guides). The Proponent indicates that at the maximum of the new terminal operation, additional deposits equivalent to a maximum of 4.4% of current deposits and 2.5% of the old RAA assessment criterion would be generated (Englobe, 2020c). Environment and Climate Change Canada believes that in most cases, paved roads are not a significant source of dust if they are well maintained.

Odours

During the operational phase, modelling related to diesel engine exhausts shows that there would be odour levels above the odour threshold. However, the number of exceedances is lower than that allowed by the MELCC air quality criteria which tolerate up to 175 exceedances of 1 odour unit per cubic metre (o.u./m^3) per year (Englobe, 2020c).

Proposed Mitigation Measures and Follow-up Program

The optimizations made to the Project during the environmental analysis (semi-automated terminal, rail transportation preferred to trucking, electric and hybrid equipment and power supply system for ships) as well as the good practices and measures the Proponent already applies in its current operations would allow to limit the Project's effects on air quality. The Proponent also intends to promote traffic avoidance in the borough of La Cité-Limoilou to truckers. It also indicates that some initiatives, such as the development of the *Parcs urbain – Trame Verte*, would facilitate a reduction in the effects of the Project on the sector's air quality (Englobe, 2020r).

Based on modelling results for the operations phase and despite mitigation measures, operations would generate exceedances for acetaldehyde and nitrogen dioxide (NO_2) that would be exacerbated by ambient levels. Taking into account the initial concentration, total particulate matter (TPM), fine particulate matter ($PM_{2.5}$) and nickel would also show exceedances of the standards and criteria.

Following public consultations on the Agency's draft Environmental Assessment Report, the Proponent submitted a series of documents outlining work done to clarify the nature of the actual effects anticipated. In one of these documents, SNC-Lavalin (2021) explains that the ambient air conditions in the study area should have improved by the time the Laurentia Terminal reaches full capacity, around 2035-2036. As the baseline becomes more favourable, the exceedances caused by the Project would also be reduced.

According to the MELCC's 2018 *Rapport d'avancement 2018 par rapport aux normes canadiennes de la qualité de l'air ambiant* (MELCC, 2019), the management objective for the air zone in which the Laurentia Project would be carried out is to "prevent deterioration of air quality" for ozone (O^3) and to

"prevent exceedance of the NAAQS" for fine particles matter ($PM_{2.5}$). Thus, considering these objectives, the data presented in the Impact Statement for the Laurentia Project demonstrate that the current initial state of air quality in the study area is not conducive to a project that would result in the emission of additional contaminants, particularly fine particles and nitrogen oxides.

The Proponent undertakes to implement an air quality monitoring program whose objectives would be to validate whether Project activities during the operating phase generate exceedances of the guide values for particulate matter and to ensure that ambient air quality in the Port of Québec sector remains stable or improves. To achieve this, it proposes to use the three air quality monitoring stations used during the monitoring stage of the construction phase. The targeted contaminants would be the same as during the construction phase, i.e., fine particles matter ($PM_{2.5}$), inhalable particles matter (PM_{10}), total particulate matter, nitrogen dioxide and acetaldehyde (TPM) (Québec Port Authority, 2020). As with the follow-up and monitoring program during the construction phase, the Proponent would compare the results of the follow-up to the most restrictive standards or criteria between the CAAQS and the RAA. The results would also be compared with the concentrations predicted by the atmospheric modelling study. The Proponent proposes to carry it out over a period of approximately ten years, the time to account for operations at full capacity. The program requirements would then be revised taking into account measured concentrations and fluctuations in activities, which could lead to a reduction or cessation of the program if no problems related to the Project have been identified (Québec Port Authority, 2020).

Environment and Climate Change Canada recommends that the duration of the follow-up be revised taking into account the activities that would take place on the site and the growth of the port's operations (more representative periods of activity and traffic).

The Proponent also proposes an annual monitoring of the ambient air quality in the industrial-port zone in continuity with that carried out for the port's current activities. It would then use the sampling stations on 3rd and 8th Avenues as well as Old Limoilou. The Proponent does not provide detailed information on the follow-up currently being carried out. The data from these stations would be used to establish an annual portrait of air quality in the borough of La Cité-Limoilou.

Environment and Climate Change Canada encourages the Proponent to pursue this initiative in the borough of La Cité-Limoilou and to integrate it into its follow-up program.

In the documents submitted in March 2021, the Proponent proposes measures to reduce the Project's effects on air quality, particularly with regard to air emissions and greenhouse gases (Québec Port Authority, 2020b).

The Proponent is committed to implementing an atmospheric emissions reduction plan for all port operations, including those managed by its clients and partners, and to participating actively with the various levels of government to improve air quality in the borough of La Cité-Limoilou, particularly through the Comité intersectoriel sur la contamination environnementale et la qualité de l'air dans l'arrondissement La Cité-Limoilou (CICEL).

The Huron-Wendat Nation notes that many of the measures proposed by the Proponent are reactive rather than precautionary. Carrying out the Project and then confirming its effects is not, in their opinion, consistent with the precautionary principle and seems quite risky: all measures required to protect human health should be taken. Finally, Environment and Climate Change Canada is of the opinion that, in general, the environmental effects have been well documented by the Proponent. As with the construction phase, it considers that mitigation measures must be developed and rigorously implemented to limit air emissions and minimize the adverse effects of the Project on air quality.

5.1.3 Agency Analysis and Conclusions on Residual Effects

Effects Analysis

In its analysis, the Agency considered the effects of the Project on air quality resulting from the activities included in the scope of the Project, namely the construction and operation of the container ship terminal located within the boundaries of the Proponent's property and navigation within its area of jurisdiction. The effects on air quality related to road and rail transportation in the borough of La Cité-Limoilou are discussed in Subsection 6.3.5.

In general, project activities will produce gaseous air pollutants (combustion products) and dust. The contaminant dispersion study has shown that Project activities are likely to result in increased concentrations of particulate matter (TPM, PM_{10} and $PM_{2.5}$), nitrogen dioxide, formaldehyde and nickel in the atmosphere beyond the RAA or CAAQS standards during the construction phase, while during operation, port activities could result in exceedances of the RAA or CAAQS standards for total particulate matter (TPM), fine particulate matter ($PM_{2.5)}$, nitrogen dioxide, acetaldehyde and nickel.

In addition, exceedances were calculated in all areas of interest and at sensitive receptor locations in the study area for fine particulate matter ($PM_{2.5}$) (construction and operation), the 2025 hourly CAAQS for nitrogen dioxide (NO_2) (construction and operation), and the RAA standard for nickel (construction). For other contaminants, infrequent small exceedances (typically in the range of 0-2% of the time) were calculated in some areas of interest and at some sensitive receptor locations for the daily standards for particulate matter ($PM_{2.5}$, TPM and PM_{10}) and nitrogen dioxide (NO_2), and the 15-minute standard for formaldehyde. Exceedances are slightly more frequent (up to 10% of the time) in the Baie de Beauport recreational area.

The Agency relies on the advice of Environment and Climate Change Canada to conclude that the Project is likely to cause significant adverse environmental effects on air quality due to increased emissions of particulate matter into the air and contaminants from the use of fossil fuels in an environment previously saturated with air contaminants. Uncertainties remain regarding particulate matter emissions and dust deposition during the construction phase since rather optimistic assumptions were considered. Uncertainties also persist for modelled flue gas concentrations and more specifically for nitrogen dioxides for the construction and operational phases.

The Agency understands that while these exceedances are likely common in the region and would not be entirely attributable to the Project, the situation needs to be addressed carefully, particularly given the potential links to human health risks associated with diesel exhaust and particulate air emissions.

In addition, neighbourhood councils, environmental and citizen groups, l'Association Québécoise des médecins pour l'environnement, many citizens, and municipal and provincial elected officials are stressing the need to reduce concentrations of current air pollutants that approach or reach air quality standards before accepting any additional inputs of these pollutants.

The Huron-Wendat Nation is also concerned about air quality, particularly for community members who live, work or practise activities in the vicinity of the Project. It considers that air emissions from all existing activities in the industrial zone should be improved so as not to constrain any future development.

The Agency agrees with Environment and Climate Change Canada that it is difficult to assess the combined effectiveness of the planned mitigation measures to reduce contaminant emissions from the Project. Their overall effectiveness could only be demonstrated at the time of their application on-site. It is therefore essential that the mitigation measures be rigorously implemented and that a follow-up program confirm the nature, magnitude and intensity of residual air quality effects so that corrective measures can be taken, if necessary.

Agency's Conclusion

At the end of its analysis and according to the evaluation criteria and decision grid presented in Appendix A, the Agency concludes that the Project is likely to cause significant adverse environmental effects on air quality (Appendix B), despite the optimizations made by the Proponent during the environmental analysis and the consideration of the key mitigation measures detailed below. The additional contribution of the Project in an environment where air quality is already significantly affected, particularly with respect to total particulate matter (TPM), fine particulate matter ($PM_{2.5}$), nitrogen dioxide, nickel and diesel particulate matter, would likely result in a significant deterioration of air quality in surrounding residential neighbourhoods and public places. The Agency concludes that the significance of the effects would be high for the following reasons:

- The intensity of the effects of the Project would be high since the atmospheric contribution of the Project would increase the concentrations of contaminants of potential concern to exceed the CAAQS (2020 - 2025) or MELCC RAA criteria;
- The Project would result in a long-term regional change as the effects would extend beyond the local study area (airshed area) and would be felt over a period of more than five years;
- This change would be irreversible and continuous over time.

Identification of Key Mitigation Measures

The Agency has taken into consideration that air quality in the region is already affected and will continue to deteriorate due to the concentration of combustion and dust generation activities. In some areas of the airshed, conditions are considered to be near or already exceed federal and provincial air quality standards or criteria. The Project would result in additional exceedances or increase the magnitude of existing exceedances. The effects of air quality degradation on human health are discussed in Section 5.7, while the cumulative effects on air quality and human health are discussed in Subsections 6.3.5 and 6.3.6.

The Agency has identified the key mitigation measures likely to reduce the potential effects of the Project. However, these measures would not sufficiently mitigate the potential effects to render the residual effects insignificant. To identify the key mitigation measures, the Agency took into account the mitigation measures proposed by the Proponent, the opinions of government authorities, as well as the comments received from the First Nations consulted and the public:

For the Construction Phase

- Use rail transportation (instead of trucking) to import the majority of fill material to the job site;
- Use, during construction phase, zero-emission equipment and vehicles or, if a particular zero-emission equipment or vehicle is not available or not technically or economically feasible, use a low-carbon or diesel fuel equipment or vehicle that meets, at a minimum, Tier 4 emission standards;
- Reduce the size, power and operating time of equipment required for construction;
- Reduce wind erosion and airborne particulate emissions:
    - Clean or water surfaces and spoil in the construction area (including areas where stripping and grading activities take place, backfill unloading area and traffic areas, spoil on site and in railcars) to reduce dust generation and transport beyond the Proponent's property boundaries;
    - Stabilize or quickly restore the work area to avoid wind erosion. When soils are excavated, continuously backfill exposed soils or cover them with impermeable covers as soon as the work is completed (daily) to limit wind erosion or rain leaching. Pay particular attention to wind erosion when preparing the site and when laying out the vegetated slope;
    - Cover with tarpaulins any loads that may release particles into the air;
    - Cover dikes, settling pond walls, piles of material (gravel and sand) and dredged sediments with waterproof tarps. Ensure that the impermeable covers are effective;
    - Use dust suppressants that comply with the BNQ 2410-300 standard of the Bureau de Normalisation du Québec to reduce the emission of particles into the air;
    - Paving the entire site in the shortest possible time;
    - Do not handle granular materials in high winds or when the wind is blowing towards sensitive receptors; otherwise use dust suppressors to minimize dust generation. The Proponent must measure wind speed and, when the wind reaches 19 kilometres per hour or more, measures must be put in place to reduce wind erosion. The Proponent must implement concrete measures to enforce these measures;

  - Limit the height at which the material is unloaded and the distance over which it will fall freely to reduce the emission of particles into the air;
  - Immediately stop construction activities if conditions could result in dust and contaminant emissions to sensitive receptors (activities could then be moved to another area);
  - Install and regularly maintain dust collectors or devices to reduce particulate emissions in areas where operations may generate dust.
- Optimize the logistics of equipment movement to control transportation in order to avoid unnecessary emissions and increase efficiency of use (develop an efficient road routing system on the worksite, schedule vehicle and equipment movements and work methods to minimize time and distances travelled);
- Minimize container loading and unloading times during construction phase;
- Limit vehicle travel speeds to less than 15 kilometres per hour and put in place concrete measures to enforce these measures;
- Operate switching locomotives to transfer cars from the Project's train loading area to CN's Beauport rail yard that meet, as a minimum, the Tier 4 emissions standards as set out in the *Locomotive Emission Regulations*;
- Implement a Policy prohibiting idling of engines using fuels and put in place concrete measures to enforce these measures;
- Implement specific mitigation measures for the use of the concrete plant:
  - Install the concrete plant in an area where exposure to prevailing wind is minimal;
  - Install and maintain dust collectors on a regular basis;
  - Stored all granular materials with a particle size of less than 3 millimetres (bulk cement, bentonite and similar fine dry materials) required for the concrete plant in silos;
  - Maintain a high moisture content of the aggregates to reduce particulate emissions to the air through wind erosion;
  - Use all effective means to protect aggregate piles or other materials from wind to prevent wind erosion;
  - Arrange piles (shape/geometry) to minimize the exposed surface area of aggregate stockpiles and reduce wind erosion. For example, use windproof fences/screens or platforms below ground level;
  - Minimize the number of raw material transfer points and close them partially or completely;
  - Minimize the height of fall of conveyors or hoppers.

For the Operational Phase

- Acquire and use port equipment equipped only with electric motors rather than hybrid (electric/diesel) motors corresponding to what was used for air emission modelling. This will include, the following equipment: quay gantry cranes, rail cranes and cantilever rail cranes;

- Use electric tractor units, horizontal transport vehicles, stacking cranes and empty container handlers during operational phase or, if particular equipment or vehicles are not available in electric form or their use is not technically or economically feasible;
- Minimize container loading and unloading times during operational phase;
- Keep traffic areas clean to minimize dust generation after trucks pass by;
- Maintain driveways and running surfaces, and repair surfaces when required;
- Maintain vehicles and equipment according to the manufacturer's specifications to keep them in good working order. Ensure that emission control technologies are not removed from the vehicle or equipment, unless their removal is necessary for repair and maintenance activities, after which they must be reinstalled or replaced before the vehicle or equipment is returned to service;
- Use trucks that are in good working order and meet Environment and Climate Change Canada's most up-to-date emission standards for on-road and off-road vehicles;
- Carry out a preliminary and regular inspection of the machinery to ensure its good condition and proper operation, particularly the exhaust and antipollution systems;
- Limit the speed of vehicles to less than 15 km/h and put in place concrete measures to enforce these measures;
- Operate switching locomotives that meet, as a minimum, the Tier 4 emissions standards as set out in the *Locomotive Emission Regulations*;
- Implement during construction and operational phases a Policy prohibiting idling of engines using fuels for mobile equipment and road vehicles in the Project area and requiring all persons to comply with this policy, unless there are health or safety constraints;
- Provide incentives for container trucking to use the Félix-Leclerc and Dufferin-Montmorency highways. Truckers should only use Henri-Bourassa Boulevard for local deliveries or when traffic on the above-mentioned highways is diverted. In an annual report, the Proponent specifies the proportion of trucks that used Félix-Leclerc and Dufferin-Montmorency highways to reach or leave the Project during the reporting year;
- Encourage train operators serving the Project with locomotives equipped with automatic shutdown and restart devices to use these devices while on the construction site to limit engine idling, unless weather and/or health or safety constraints exist;
- Establish monitoring and communication practices to issue warnings to vessels discharging excessive amounts of smoke. The Proponent documents observed smoke events and any actions taken by the Proponent in response to each smoke event;
- Install and maintain the necessary equipment for the electrical connection to the ships' berths as provided for in the design measures of the Project;
- Develop, prior to operation and in consultation with Environment and Climate Change Canada, and implement life cycle air emission reduction plan for various contaminants, including specific non-threshold contaminants associated with engine exhaust including diesel particulate matter, for the life of the Project. This plan should specify reduction measures to be implemented and quantifiable targets.

Need for Follow-up and Follow-up Requirements

Uncertainties have been raised about the effectiveness of air quality mitigation measures. In order to verify the predictions of effects on air quality and the effectiveness of the proposed mitigation measures, the Agency recommends that a follow-up program, which includes the following requirements, be developed and implemented:

Develop, in consultation with Environment and Climate Change Canada and the Ministère de l'Environnement et de la Lutte contre les changements climatiques, and implement a follow-up program to verify the accuracy of the environmental assessment and to assess the effectiveness of mitigation measures with respect to the adverse environmental effects of air quality changes caused by the Project during construction and operation. The Proponent shall :

- Install, prior to construction and taking into account the Ministère de l'Environnement et de la Lutte contre les changements climatiques' *Air Quality Monitoring Station Guidelines* and the Canadian Council of Ministers of the Environment's *Ambient Air Quality Monitoring Protocol for $PM_{2.5}$ and Ozone*, new sampling stations to monitor:
  - Air quality from the Project in the Beauport Bay recreational and tourism area;
  - Air emissions from the concrete plant;
  - Air quality in the surrounding residential areas.
- Monitor, during construction and at a frequency determined during the development of the monitoring program, the concentrations of fine particulate matter ($PM_{2.5}$), inhalable particulate matter (PM_{10}), total particulate matter (TPM), acetaldehyde, formaldehyde, nitrogen dioxide, and nickel at the sampling stations used in the environmental assessment and at the new stations. Compare the monitoring results to the most restrictive criteria for each of the contaminants between the Canadian Council of Ministers of the Environment's Canadian Ambient Air Quality Standards and Quebec's Clean Air Regulation;
- Monitor dust deposition during the construction phase at least during the periods when a maximum of dust would be emitted;
- Monitor at a specified frequency during operation concentrations of fine particulate matter ($PM_{2.5}$), inhalable particulate matter (PM_{10}), total particulate matter (TPM), acetaldehyde and nitrogen dioxide at the sampling stations used for the environmental assessment and at new stations. Consider the nature of the activities carried out and representative activity and traffic periods;
- Compare the monitoring results to the most restrictive criteria for each of the contaminants between the Canadian Council of Ministers of the Environment *Canadian Ambient Air Quality Standards* and the *Clean Air Regulation* and, for inhalable particulate matter (PM_{10}), to World Health Organization standards. Also compare the monitoring results for these contaminants with the results of the modelling carried out by the Proponent as part of the environmental assessment;
- Compare the monitoring of dust deposition to the monthly standard for dust deposition set out in Ontario's *Air Pollution – Local Air Quality Regulation* (419/05);
- Publish monitoring results on the Internet in a manner that allows real-time visualization of changes in air quality from previous periods and demonstration of how the results compare to the target air quality

criteria and to the results of the modelling carried out by the Proponent as part of the environmental assessment;

- Develop and implement modified or additional mitigation measures if monitoring results demonstrate that modified or additional mitigation measures are required to maintain concentrations of fine particulate matter ($PM_{2.5}$), inhalable particulate matter (PM_{10}), total particulate matter (TPM), formaldehyde, nitrogen dioxide, acetaldehyde, and nickel, and dust depositions below the values modelled in the environmental assessment;
- Update the follow-up program for the operation based on the monitoring results and according to a schedule determined at each review in consultation with the parties consulted in the development of the follow-up program;
- If monitoring results demonstrate air degradation in La Cité-Limoilou during operation, develop and implement, in consultation with the Comité intersectoriel sur la contamination Environnementale dans l'arrondissement La Cité-Limoilou (or any equivalent stakeholder that aims to improve air quality in La Cité-Limoilou), modified or additional mitigation measures to mitigate the environmental effects of the changes to air quality caused by the Project;
- Develop and submit to the Agency, prior to construction, a protocol for receiving complaints about air emissions from the Project, and implement it during construction and operation. The Proponent shall submit the protocol to the Agency prior to construction. As part of the implementation of the protocol, the Proponent shall:
    - Responds to any feedback received within 48 hours of receipt and implements any corrective action under its control to mitigate air emissions from the Project as soon as technically feasible;
    - Make public a record of all feedback received during the year and any corrective actions it has implemented or plans to implement.
- Develop, prior to operation and in consultation with Environment and Climate Change Canada, and implement during operation, an Air Emissions Reduction Plan aimed at continuous improvement in the reduction of air emissions, including greenhouse gases, from all of the Proponent's port activities, including greenhouse gases, non-threshold contaminant emissions associated with engine exhaust (including diesel particulate matter) and concentrations of fine particulate matter ($PM_{2.5}$), inhalable particulate matter (PM10), total particulate matter (TPM), acetaldehyde and nitrogen dioxide. As part of the plan development, define quantifiable emission reduction goals that target carbon neutrality and identify the reduction measures that will be implemented to achieve these goals during any phase of the Project. As part of the implementation of the plan the Proponent shall:
    - Make public the inventory of air emissions covered by the plan from all of the Proponent's port activities;
    - Report on progress in reducing air emissions;
    - Determine in consultation with Environment and Climate Change Canada, after the fifth year of operation and thereafter according to the schedule determined at each review. If the Proponent revises the plan, the Proponent shall submit any revised plan to the Agency and Environment and Climate Change Canada within 30 days of the revision of the plan.

- Continue to implement and participate, throughout the duration of the Project and in consultation with the Comité intersectoriel sur la contamination environnementale dans l'arrondissement de La Cité-Limoilou, in initiatives aimed at the continuous improvement of air quality in the borough of La Cité-Limoilou.

5.2 Transboundary Environmental Effects – Greenhouse Gas Emissions

The Project could lead to transboundary environmental effects related to greenhouse gas emissions. However, the Agency is of the view that the adverse transboundary residual environmental effects are not likely to be significant since the greenhouse gas emissions attributable to the Project would be relatively low in volume compared to provincial and national greenhouse gas emission levels. Under the maximum terminal operations scenario, annual emissions of about 20,000 tonnes of CO_2 equivalent[19] would be generated. This volume would represent 0.0256% of Quebec's total greenhouse gas emissions and 0.0028% of Canada's total, based on 2017 emission levels recorded by Environment and Climate Change Canada. Average annual emissions over the three years of construction would be lower and would total approximately 6,800 tonnes of CO_2 equivalent.

The following subsections present the information considered by the Agency in its analysis to conclude on the significance of greenhouse gas-related effects, including the opinions and comments of expert departments, First Nations consulted and the public.

5.2.1 Description of the Component "Greenhouse Gas Emissions"

Greenhouse gases are atmospheric gases that absorb and re-emit infrared radiation resulting in the warming of the lower levels of the atmosphere. They are recognized as being one of the causes of climate change that can have a variety of impacts on ecosystems and human health. The main greenhouse gases include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), ozone (O_3), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs). Greenhouse gas estimates are usually expressed in units of kilotonnes of carbon dioxide equivalent per year (CO_2 equivalent per year). These gases disperse at the global scale and, under CEAA 2012, are considered to have transboundary environmental effects.

[19] Emissions of CO_2, CH_4 and N_2O are calculated by multiplying the emission rate of each substance by its global warming potential relative to CO_2 equivalent.

Under the *Regulation respecting mandatory reporting of certain emissions of contaminants into the atmosphere,* the Government of Quebec collects data on greenhouse gases released by Quebec businesses. Any individual who operates an establishment with greenhouse gas emissions of 10 kilotonnes of CO_2 equivalent per year or higher is required to report their greenhouse gas emissions every year. At the federal level, under the *Canadian Environmental Protection Act* (1999), the reporting threshold has been 10 kilotonnes of CO_2 since 2017. Any facility with greenhouse gas emissions of at least 10 kilotonnes of CO_2 equivalent per year is required to report their emissions to Environment and Climate Change Canada.

In 2017, total greenhouse gas emissions in Quebec were 78,635 kilotonnes of CO_2 equivalent while total emissions across Canada were 714,000 kilotonnes of CO_2 equivalent[20]. The sector producing the most greenhouse gas emissions in Quebec in 2017 was transportation (road, air, marine and rail) with 34,056 kilotonnes of CO_2 equivalent [21] . In 2017, 1,620 facilities in Canada reported a total of 263,000 kilotonnes of greenhouse gas emissions under Environment and Climate Change Canada's Greenhouse Gas Reporting Program. CO_2 represented the majority of the total reported emissions (80%), while CH_4 and N_2O emissions each represented 13% and 5%, respectively. In 2017, the largest quantity of greenhouse gas emissions in Canada was generated in oil and gas extraction, accounting for 26% (188,000 kilotonnes of CO_2 equivalent). This was followed by the transportation sector, which represented 25% (approximately 178,600 kilotonnes of CO_2 equivalent) and the construction sector, which represented 12% (85,400 kilotonnes of CO_2 equivalent). Of the Canadian facilities reporting emissions in 2017, approximately 11% emitted 250 kilotonnes of CO_2 equivalent or higher.

5.2.2 Analysis of Potential Effects and Proposed Mitigation Measures

The Essipit, Pessamit and Pekuakamiulnuatsh (Mashteuiatsh) Innu First Nations raised concerns with regard to the Project's impact on greenhouse gas emissions. Concerns were also expressed by certain organizations and the public about the larger and broader context of the greater Québec City area and, more specifically, about greenhouse gas emissions related to road and rail traffic in urban areas. Citizens also raised questions about how the Project aligns with greenhouse gas emissions reduction targets in Quebec and Canada. Due to the concerns raised by the public, the Agency identified road and rail traffic activities in the borough of La Cité-Limoilou that are associated with the Project and could impact air quality and human health as a matter relevant to the environmental assessment under paragraph 19(1)(j) of CEAA 2012. In response to this request, the Proponent decided to include emissions from transports in its analysis without distinguishing them from direct emissions from the Project (Englobe, 2020c). Thus, the Proponent's inventory of contaminant and greenhouse gas emissions includes direct sources within the limits of the borough of La Cité-Limoilou from road and rail traffic and within the administrative limits of the Québec Port Authority on the seaway from vessels and other marine vehicles (Englobe, 2020c).

[20] https://www.canada.ca/content/dam/eccc/documents/pdf/cesindicators/ghg-emissions/2020/greenhouse-gas-emissions-en.pdf

[21] http://www.environnement.gouv.qc.ca/changements/ges/2017/Tableaux-emissions-annuelles-GES-1990-2017.pdf

The greenhouse gas emissions evaluated by the Proponent for the construction and operational phases are primarily those associated with fuel combustion, namely CO_2, CH_4,N_2O and black carbon. The Proponent calculated emissions related to the Project by adding the contribution of each emitted gas to global warming, as recognized by Environment and Climate Change Canada[22].

The greenhouse gas emissions considered during the construction phase are those generated by vessels transporting materials, locomotives and other combustion systems. The three years of construction would generate 5,594, 7,138 and 7,622 tonnes of CO_2 equivalent, respectively.

The greenhouse gas emissions considered during the operational phase are those generated by vessels, tugs, trucks, Canadian National Railway locomotives, the Proponent's locomotives, and the refrigerated containers of other vehicles (Englobe, 2020c). Greenhouse gas emissions related to the consumption of electricity from Quebec's public network were also taken into consideration by the Proponent.

The total emissions generated per year under the maximum terminal operations scenario would be between 5,600 and 20,000 tonnes of CO_2 equivalent[23], which represents 0.0072% to 0.0256% of Quebec's total greenhouse gas emissions and 0.0008% to 0.0028% of Canada's total greenhouse gas emissions, based on 2017 emission levels recorded by Environment and Climate Change Canada. The portion of these emissions associated solely with container handling activities on the Project site, i.e., the direct emissions for this Project, would be a maximum of 5,359 tonnes of CO_2 equivalent. The majority of emissions, a maximum of 14,545 tonnes of CO_2 equivalent, would be associated with container freight transport off the Project site by third parties, including Canadian National Railway and commercial truckers. Estimates of greenhouse gas emissions generated for one year of operation at maximum capacity, a maximum of 19,916 tonnes of CO_2 equivalent, are presented in Table 10. For comparison purposes, the 10 largest greenhouse gas emitters in Canada generated between 4,784,797 and 11,782,560 tonnes of CO_2 equivalent. The 10 largest greenhouse gas emitters in Quebec generated between 763,285 and 1,186,808 tonnes of CO_2 equivalent.

[22] Contribution of the main greenhouse gases to global warming in tonnes of CO_2 equivalent: CO_2 = 1; CH_4 = 25; N_2O = 298; black carbon = 900.

[23] The emission of each gas is calculated by reporting it as "tonnes of carbon dioxide equivalent" (Englobe, 2020c).

Table 10: Project-related greenhouse gas emissions generated on the Project site and in La Cité-Limoilou over 1 year of operations at maximum capacity

Description of source	Estimated greenhouse gas emissions (tonnes per year)				
	Carbon dioxide	Methane	Nitrous oxide	Black carbon	Total CO_2 equivalent emissions
Maritime transport[1]	8,684	0.817	0.234	3.815	12,207
Road transport[2]	573	0.024	0.033	0.085	661
Rail transport[3]	423	0.022	0.139	0.115	568
New terminal[4]	5,916	0.194	0.421	0.47	6,480[5]
Total	15,596	1.057	0.828	4.484	19,916

Source: Adapted from Englobe, 2020c.

(1) Vessels and tugs (emissions within the Proponent's administrative limits only).
(2) Trucks (emissions within the borough of La Cité-Limoilou only).
(3) Canadian National Railway locomotives (emissions within the borough of La Cité-Limoilou only).
(4) Proponent's locomotives, refrigerated containers, vehicles, electricity.
(5) Addition of 12 tonnes of CO2 equivalent per year for electricity.

The MELCC considers that the quantification methodologies used by the Proponent to estimate greenhouse gas emissions from the construction and operational phases of the Project are adequate. The Proponent had a comparative analysis carried out of the environmental footprint of container traffic following the implementation of the Project compared to a hypothetical scenario of non-completion of the Project. According to the conclusion of the study, the implementation of the Project would allow, for the 2024-2038 period, a total reduction of greenhouse gases of more than one million tons of CO_2 equivalent, more than 66,000 tons of CO_2 equivalent per year. Thus, the Project would allow, during its operation, reductions in greenhouse gases compared to the status quo (non-implementation of the Project), because maritime transport, less polluting, would replace part of rail or road transport. The MELCC considers that this comparative study is generally adequate. It is also of the opinion that the assumptions presented in the modelling are plausible and credible despite the fact that it was not possible to fully validate the modelling carried out (due to the lack of raw data) and that certain assumptions remain difficult to be checked (in particular as regards maritime traffic which would be diverted from other ports).

Finally, the direct emissions from the Laurentia Project would add approximately 0.03% to Quebec's greenhouse gas balance.

Mitigation and Follow-up Measures Set Out by the Proponent

The Proponent proposes certain mitigation measures to minimize greenhouse gas emissions by contractors during construction, for example :

- Use partially renewable fuels, such as B5 diesel, for trucks and heavy machinery;
- Use replacement materials for cement manufacturing;
- Require that the supply of granular material by truck be limited to 20% of total volumes;
- Use devices or particles to limit engine idling;
- Use optimally size equipment to avoid over-consumption of fuel and rigorous planning to optimize equipment uptime;
- Add clauses to construction contracts to require contractors to use Group 4 heavy equipment and the option of hybridization of inter-construction trucks.

For greenhouse gas emissions that cannot be avoided during the construction phase, the Proponent plans to incorporate contractual clauses requiring contractors to propose a comprehensive greenhouse gas management plan and to measure their residual emissions in order to provide for equivalent offsetting. The Proponent is analyzing the possibility of setting up reward and penalty mechanisms to reinforce the implementation of effective measures. By implementing these measures, the Proponent intends to achieve carbon neutrality for the construction phase of the Project.

In the operational phase, the Proponent is committed to using 100% electric equipment (4 quayside gantry cranes, 12 rail cranes and 3 cantilevered cranes) and vehicles with hybrid technology (6 tractor trucks and 17 horizontal transport vehicles, all automated, 2 stacking cranes and 2 empty container carts). It also plans to optimize the movements of the vehicles handling the containers in order to minimize the distance travelled. It will also provide electric power to vessels at the dock and will promote this source of energy through various incentive programs. According to the MELCC, this last measure would eliminate or significantly reduce emissions from ships auxiliary engines and boilers. It also wishes to implement various incentive programs for low-emission trucks and locomotives.

The Proponent states that additional greenhouse gas reduction measures will be put in place following the annual review of greenhouse gas emissions during the construction and operational phase, if required. The Agency also notes that several measures presented as mitigation measures are rather initiatives that the Proponent wishes to put in place, to the extent possible. Without certainty as to their application, it becomes difficult to consider them in the environmental analysis. Finally, the Proponent undertakes to offset the residual greenhouse gas emissions directly related to the terminal's activities and which are under its control.

5.2.3 Agency Analysis and Conclusions on Residual Effects

Agency's Analysis and Conclusions

The Agency is of the view that the Project is not likely to cause significant adverse transboundary environmental effects (Appendix B) given its small contribution to greenhouse gas emissions at the provincial and national level and the implementation of mitigation measures proposed by the Proponent. Total emissions generated per year under the maximum terminal operations scenario would be approximately 20,000 tonnes of CO_2 equivalent[24], which includes direct emissions and those related to off-site container transport. These emissions amount to 0.0256% of total greenhouse gas emissions in Quebec and to 0.0028% of total emissions in Canada, based on 2017 emission levels recorded by Environment and Climate Change Canada. However, the effects of greenhouse gas emissions would be global, long-lasting and irreversible due to the persistence of CO_2 in the atmosphere. It should also be noted that estimates of indirect emissions from freight transportation are based on the assumption that 90% of container shipping would be by rail and 10% by road. A higher ratio of road transportation could generate a greater amount of greenhouse gases.

Canada's commitment to implement the Canada-wide Framework on Clean Growth and Climate Change, to strengthen existing greenhouse gas reduction measures and to introduce new ones in order to exceed Canada's emission reduction target by 2030. As such, any greenhouse gas emissions from the Project, despite the measures that will be put in place, could result in an adverse residual effect. Environment and Climate Change Canada encourages the Proponent to offset some or all of its greenhouse gas emissions through the purchase of offset credits or through the purchase of offset credits or through the development of off-site Project opportunities leading to a reduction in greenhouse gas emissions or the establishment or increase of carbon sinks as it proposes.

Key Mitigation Measures to Avoid Significant Effects

The Agency identified several key mitigation measures to reduce the effects of the Project on air quality, which will also contribute to reducing greenhouse gas emissions, including the installation and operation of an electrical connection for ships at berth (Section 5.1). The Agency is of the view that the Proponent must implement every available mitigation measure to reduce the Project's contribution to greenhouse gas emissions. The Proponent is also required to monitor and report its Greenhouse gas emissions to Environment and Climate Change Canada and the Government of Quebec every year if emissions exceed the reporting threshold currently set at 10 kilotonnes of CO_2 equivalent per year. To identify the key mitigation measures, the Agency took into account the mitigation measures proposed by the Proponent, the advices of government authorities, as well as the comments received from First Nations and the public:

[24] Emissions of CO_2, CH_4 and N_2O are calculated by multiplying the emission rate of each substance by its global warming potential relative to carbon dioxide.

Construction Phase

- Maintains all vehicles and equipment according to the manufacturer's specifications to keep them in good operating condition and ensures that emission control technologies are not removed from the vehicle or equipment unless their removal is necessary for repair and maintenance activities, after which they must be reinstalled or replaced before the vehicle or equipment is returned to service;
- Use zero-emission equipment and vehicles or, if zero-emission equipment or vehicles are not available or their use is not technically or economically feasible, provide the Agency with a rationale for this determination and use low-carbon fuel or diesel equipment or vehicles that meet, at a minimum, the Tier 4 emission standards;
- Use rigorous planning to optimize operating time;

Operational Phase

- Optimizing loading and unloading operations at the terminal (automation and programming of logistic sequences), allowing in particular a significant reduction in the movement of mobile equipment on-site (reducing the energy consumption of hybrid equipment);
- Develop, in consultation with the competent authorities, and implement a greenhouse gas emissions reduction plan for the life of the Project. This plan should specify reduction measures to be implemented and quantifiable targets in order to achieve carbon neutrality during the construction and operation of the Project.

Need for Follow-up and Requirements of Follow-up

A green house gas inventory is carried out annually by the Proponent for its activities under the Green Alliance certification program. It also mentions that an annual assessment of greenhouse gas emissions during the construction and operational phase will be made. Based on the emissions date, the Agency recommends the following follow-up program that would make it possible to judge the effectiveness of the mitigation measures:

- Monitor the greenhouse gas emissions emitted by the Project during construction and operation at a frequency that takes into account the nature of the activities carried out under the Project and representative periods of activity and traffic. Compare the results of this monitoring to the objectives defined during the development of the monitoring program;
- Review periodically the frequency at which monitoring is conducted, taking into account the volume of Project operations. Conduct any subsequent monitoring at the revised frequency, as appropriate;
    - Develop and implement modified or additional mitigation measures if monitoring results demonstrate that modified or additional mitigation measures are required to reduce greenhouse gas emissions from the Project and to achieve the objectives identified in the follow-up program.
    - At each revision of the monitoring program applicable to the operational phase, revise the targets defined in consultation with the parties that have been consulted. Implement the updated monitoring program.

5.3 Wetlands

The Agency believes that the Project is unlikely to cause significant adverse residual environmental effects on wetlands and their ecological and socio-economic functions since the Proponent would avoid all wetlands. As such, the Project would not result in any loss or disturbance of wetland areas or functions. However, a program to monitor the evolution of the wetlands will have to be implemented to verify the accuracy of the environmental assessment's conclusions. In particular, the monitoring will have to verify that changes in hydrodynamic conditions and in the sedimentological regime that would be induced by the Project's infrastructure would not have an adverse effect on the wetlands and their functions during the operational phase. Monitoring of the changes in the wetlands as well as adaptive measures, if necessary, will have to be implemented.

The following subsections present the information considered by the Agency in its analysis to conclude on the significance of the Project's effects on wetlands, including the advices and comments of the expert departments, First Nations consulted and the public.

5.3.1 Description of the Component "Wetlands"

The wetlands likely to be affected by the Project are located on federal public lands owned by the Québec Port Authority. The federal and provincial governments recognize the importance of wetlands, notably through the *Federal Policy on Wetland Conservation* (the Policy; Environment Canada, 1991) and the *Act respecting the conservation of wetlands and bodies of water*.

The main objective of the Policy is to promote the conservation of Canada's wetlands to sustain their ecological and socio-economic functions, now and in the future (Environment Canada, 1991). It requires the Government of Canada to consider the Policy, its objectives and strategies when taking any action or undertaking any activity that may have an impact on a Canadian wetland. The Québec Port Authority is responsible for applying this policy because it manages public lands on which wetlands are located. The Agency, as a responsible authority, must take this into account throughout the environmental assessment process and ensure that the Proponent puts into practice the principles of the Policy. One of the strategies (Strategy 2) of the Policy is to engage all federal departments to commit to no net loss[25] of wetland functions: (i) on federal lands and waters, (ii) in areas influenced by the implementation of federal programs where wetland loss or degradation has reached critical proportions, and (iii) in areas where federal activities affect wetlands designated as ecologically or socio-economically important to a region (Environment Canada, 1991).

It is important to note that the Port of Québec is located in an area where wetland loss or degradation has reached critical proportions and which is identified in the appendix[26] of the Implementation Guide for the Environment Canada Policy (1996). Environment and Climate Change Canada also considers these

[25] No net loss of wetland functions means offsetting for any functions lost through wetland destruction.
[26] The Federal Policy on Wetland Conservation: An Implementation Guide for Federal Land Managers

wetlands to be of ecological importance, particularly for migratory bird habitats. Lastly, these wetlands are part of both a Waterfowl Conservation Area and an Important Bird Area.

For wetlands located on Crown lands in Quebec, the Quebec *Act respecting the conservation of wetlands and bodies of water* calls for the application of the "avoid, reduce, offset" sequence and advocates at all times an approach that ensures the consolidation of functional ecosystems, rather than the restoration of fragmented and degraded environments. Environment Canada's Implementation Guide for Federal Land Managers (1996) also advocates for this sequence to be applied to avoid any net loss of function.

Wetland Reference Condition

The study area selected by the Proponent to assess the effects of the Project on wetlands and their functions is the construction zone (see Chapter 1, Figure 3). Several types of wetlands are present in the construction zone and are located mainly in the southwestern inlet and along the Dufferin-Montmorency highway (Englobe, 2020e). These include two bulrush marshes (13.5 hectares), a broad-leaved arrowhead marsh (3.2 hectares), a zizany marsh (2.7 hectares), a shrub swamp (0.4 hectare) and a treed marsh (1.7 hectares). Wetlands occupy a total area of 53.2 hectares, or 9% of the site area (Figure 7).

The Proponent described the habitat functions of the wetlands. According to the Proponent, wetlands in the work area are used as migratory stopover and breeding areas for birds; as spawning and feeding areas for fish; as breeding areas for amphibians; as feeding areas for turtles; and as wintering areas for several species of birds, turtles and frogs. All the wetlands in the southwestern inlet as well as those surrounding Baie de Beauport are recognized as staging areas that play an important role for different species of birds (Englobe, 2020e) in spring and fall. According to Fisheries and Oceans Canada, the Beauport site straddles both a river estuary and a shallow bay favourable to the growth of young life stages of several fish species. Fisheries and Oceans Canada indicates that several fish species use it to complete part of their life cycle by taking advantage of its location near the brackish waters of the St. Lawrence Estuary, notably American shad, designated a vulnerable species under Quebec's *Act respecting threatened or vulnerable species*, and striped bass, an endangered species under the *Species at Risk Act*. The Proponent states that the intertidal marshes in the work area are a relatively rare habitat in the study area and are considered important for the species that reside there in terms of feeding, reproduction and resting. Environment and Climate Change Canada agrees with the Proponent's description of the wetlands and considers these habitats important.

The Proponent did not describe other functions of wetlands, but points out that, generally speaking, wetlands are recognized as the most productive ecosystems due to the complex interactions between the water, soils, microorganisms, plants and animals that constitute them (Englobe, 2016). They also contribute to water quality and the environment. The Proponent also indicates that the Beauport sector is used year-round for the practice of ornithology (Englobe, 2016). According to the Ministère de l'Environnement et de la Lutte contre les changements climatiques (MELCC), the habitat functions of wetlands have been well described.

Figure 7: Identification of habitats related to terrestrial environments, wetlands and beaches

Source : Englobe, 2020e

5.3.2 Analysis of Potential Effects and Proposed Mitigation Measures

The wetlands present in the work area, located mainly in the southwestern inlet and along the Dufferin-Montmorency highway, would not be affected by the Project. According to the Proponent, no loss of wetland area or function is expected (Englobe, 2020e) during the construction phase. In the operational phase, the presence of the wharf and the area behind the wharf would lead to a decrease in long-term sediment transport over the wetlands. Indeed, once the Project is completed, the presence of the port extension would lead to a lower net transport of sediment northward than at present which could result in a beach setback. Completion of the Project would decrease the effect of transporting sediment over the wetlands and increase the beach setback, and the volume of sediment transported to the sandy spit and the southwestern inlet would be lower. As a result, the Proponent does not anticipate any effect on the quality, distribution or functions of the wetlands located in Baie de Beauport or in the southwestern inlet during the operational phase (Englobe, 2020e). Environment and Climate Change Canada is satisfied with the Proponent's interpretation of sediment transport and the progression of the sandy spit of the southwest inlet following Project completion.

Concerns have been raised by the Huron-Wendat Nation regarding wetland offset projects, specifically in relation to the risk of loss or degradation of wetlands should the annual monitoring report show that the Project has an adverse effect them. Certain First Nations, including the Grand Conseil de la Nation Waban-Aki and the Mohawk Council of Kahnawà:ke, are concerned about the effects of port projects on wetlands and the loss of these environments in the St. Lawrence River.

Mitigation and Follow-up Measures Proposed by the Proponent

The Proponent made sure to avoid wetlands. Thus, the Proponent does not anticipate any permanent loss and considers that no mitigation measures directly aimed at protecting wetlands are necessary. The Proponent nevertheless proposes general mitigation measures for good management to ensure that the work does not affect habitats (Englobe, 2020r).

Environment and Climate Change Canada is of the opinion that the proposed Project meets the primary objective of no net loss of wetland function of the *Federal Policy on wetland conservation* and considers that the residual adverse environmental effects have been satisfactorily described by the Proponent. However, it is of the opinion that uncertainty remains as to the long-term effects on wetlands in the Baie de Beauport or in the southwestern inlet that would be associated with the morpho-sedimentological changes caused by the Project. Follow-up of these effects would help address this uncertainty. Environment and Climate Change Canada therefore considers that a follow-up of the wetlands is necessary to ensure the accuracy of the environmental assessment and to verify whether the new port infrastructures will have a significant influence on the evolution of the wetlands of the southwestern inlet. The Proponent proposes monitoring the wetlands based on inventories that would make it possible to track their evolution by analyzing changes in the surface area of the wetlands and their floristic composition. The follow-up inventories would provide a list of the plant species present and the percentage of cover by validating the boundaries and surface areas

of the environments. The presence of new species as well as the composition of the substrate would also be documented. In this way, the progression of facultative wetland species or terrestrial species would indicate that the environment tends to evolve towards a terrestrial environment, while an increase in the predominance of obligate wetland species could suggest the opposite. The monitoring would be carried out in years 1, 3 and 5 of operation and the Proponent would ensure that the recommendations of the report produced in year 5 are followed. The Proponent would submit a proposal for an extension to the Agency and to Environment and Climate Change Canada if further follow-up is required (Englobe, 2020e). The Proponent justifies that a five-year period is sufficient to determine whether changes are occurring in the wetlands or that there is no effect. An inter-year comparison would also be carried out (Englobe, 2020r).

According to Environment and Climate Change Canada, detecting changes in the composition or distribution of wetlands could take several years and the monitoring period must be long enough to assess the maintenance of wetland integrity over the long term. Should adverse effects on wetlands be detected during monitoring, adaptive management measures such as offsetting measures may be required to meet the Policy's objective of no net loss of wetland functions. Thus, Environment and Climate Change Canada recommends that the follow-up proposed by the Proponent be extended beyond the five-year period to adequately document the effects over time on wetlands.

With respect to the net transport of sediment northward, which could lead to an increase in beach retreat and a decrease in the volume of sediment transported to the sandy spit and to the southwestern inlet, the Proponent indicates that a morpho-sedimentary follow-up is planned in order to document the evolution of the Baie de Beauport beach. The Proponent intends to partner with the Department of Geography at Université Laval to include the beach in a larger research Project conducted by this team. Environment and Climate Change Canada recommends that this monitoring be included in the follow-up program because it will allow the evolution of erosion processes and sediment transport to be tracked. It considers that this monitoring, combined with that of the evolution of wetlands, could provide a better understanding of the effects of the Project on sediment transport and its influence on the sensitive and important biological environments of the Baie de Beauport. This monitoring is presented and discussed in Section 5.8.

The MELCC indicates in its final report that it considers the conclusions related to the effects on wetlands to be satisfactory since the Project does not directly encroach on them and is conditional on the implementation of the follow-up program and the established recommendations.

5.3.3 Agency Analysis and Conclusions on Residual Effects

Analysis of the Effects

An important history of backfilling in the St. Lawrence River near Québec City occurred between 1927 and 1987, when nearly 270 hectares were destroyed or altered by backfilling or dredging, according to Fisheries and Oceans Canada. MELCC estimates that the zone’s original area in Baie de Beauport sector, including the mouth of the Saint-Charles River, is equivalent to 614 hectares and that due to past activities, including the installation of wharves 50-51-52-53 at the Port of Québec, the construction of the Dufferin-Montmorency

highway and the development of Champlain Boulevard, the river has already been reduced by 239 hectares of wetlands and bodies of water, i.e., 39 percent of its surface area.

Although the Proponent does not anticipate any net loss of wetlands, maintaining the remaining wetlands in this portion of the St. Lawrence River is important. Environment and Climate Change Canada and Fisheries and Oceans Canada recognize their critical role in maintaining several species, including those with a special status. Wetlands are also recognized and used by many ornithologists, including the Club des ornithologues de Québec and other wildlife observers. As such, in addition to fulfilling important ecological functions, these environments also have a socio-economic role.

Based on the Policy and the advices of experts (Fisheries and Oceans Canada, Environment and Climate Change Canada and MELCC), the Agency considers that the Project is unlikely to cause significant adverse environmental effects on wetlands since the Proponent has avoided any encroachment and the Project would not result in any loss of functions. However, in order to verify the accuracy of the environmental assessment and to ensure that the infrastructure that would be put in place would not have a significant impact on these wetlands, the Agency considers that a follow-up of the evolution of the wetlands as well as a morpho-sedimentary follow-up are necessary during the operational phase to monitor the evolution of erosion processes and sediment transport. These follow-ups would make it possible to determine whether the new infrastructures have unanticipated adverse effects and, if so, to implement adaptive, offsetting or measures to or avoid or reduce these effects.

Need for Monitoring and Monitoring Requirements

Monitoring Changes in the Area and Composition of Wetlands

- Develop, prior construction and in consultation with Environment and Climate Change Canada and the Ministère de l'Environnement et de la Lutte contre les Changements cliamtiques, and implement a monitoring program for wetlands and their functions;
- Update baseline status (Englobe, 2018c) of wetlands and wetland ecological functions prior to commencement of work;
- Conduct follow up in operating years 1, 3, 5, 7 and 10;
    - Monitor the evolution of the ecological functions, area, boundaries, plant communities and floristic composition of wetlands numbers 1 (bulrush marsh), 2 (broad-leaved Sagittarius marsh) and 3 (zizany marsh) identified in Figure 7 of the Environmental Assessment Report by taking into account the principles of the simplified botanical method of the *Identification et delimitation des milieux humides du Québec meridional de 2015* guide of the Ministère de l'Environnement et de la Lutte contre les changements climatiques du Québec and by documenting the plant species present (including new species and invasive alien plant species) and the percentage of cover of each of these species;
    - The composition of the substrate;
    - Interannual changes between each year for which monitoring is conducted and relative to reference conditions.

- In the event that negative effects on wetlands are detected during monitoring, including the introduction of invasive alien species, propose, in consultation with the competent authorities, adaptive management measures such as offsetting measures in order to meet the objective of no net loss of wetland functions of the *Federal Policy on Wetland Conservation*;
- Following the results of the monitoring determine, in consultation with Environment and Climate Change Canada and the Ministère de l'Environnement et de la Lutte contre les changements climatiques, whether the monitoring should continue beyond 10 years;
- Develop, prior to operations and in consultation with Environment and Climate Change Canada and the Ministère de l'Environnement et de la Lutte contre les changements climatiques, a morpho-sedimentological monitoring program that will make it possible to track the evolution of erosion processes and quantify coastal sedimentary movements. The morpho-sedimentary monitoring should make it possible to analyze the hydrosedimentary behaviour of the beach following the completion of the Project and to determine whether the sedimentary balance corresponds to that predicted in the Lasalle NHC report (2020). The follow-up should also document the effects of the Project on the surrounding wetlands, particularly those of the southwestern entrance to Bay of Beauport;
    - Conduct follow-up in operating years 1, 3, 5, 7 and 10;
    - In the event that negative effects on wetlands are identified during the follow-up, propose, in consultation with Environment and Climate Change Canada and the Ministère de l'Environnement et de la Lutte contre les changements climatiques, adaptive management measures to reduce the effects of the Project;
    - In the event that monitoring results show phenomena (e.g., erosion or sediment displacement) that are more intense than anticipated, determine in consultation with Environment and Climate Change Canada and the Ministère de l'Environnement et de la Lutte contre les changements climatiques whether parameters should be added to the monitoring program or measures should be applied to reduce the intensity of these phenomena;
    - Following analysis of monitoring results, determine in consultation with Environment and Climate Change Canada and the Ministère de l'Environnement et de la Lutte contre les changements climatiques, if monitoring should continue beyond 10 years.

5.4 Fish and Fish Habitat, Including Aquatic Invertebrates and Special Status Species

The Agency is of the view that the Project would cause significant residual adverse environmental effects on fish and fish habitat, including aquatic invertebrates and special status species, given habitat destruction and permanent alteration, even after the application of mitigation, monitoring, offset and follow-up measures. The aquatic environment that would be affected by the Project is particularly vulnerable, complex and rare in the St. Lawrence Estuary region and offers a complete set of habitat functions suitable for several fish and invertebrate species, including the striped bass, the Atlantic sturgeon, the lake sturgeon, the American shad, the American smelt and the hickorynut. In the sector, fish intensively use intact breeding, spawning,

rearing and shelter habitats. The Project would destroy one of the only two recognized breeding habitats to date for the striped bass St. Lawrence River population. Fisheries and Oceans Canada considers that the offset program proposed by the Proponent would not make it possible, under the *Fisheries Act*, to adequately offset several of the lost habitats, given their rarity, complexity, high value, high use and advantageous positioning in the St. Lawrence Estuary. Nor would it ensure the survival or recovery of the striped bass, a species protected under the *Species at Risk Act*.

The following subsections present the information taken into account by the Agency in its analysis to conclude on the significance of the Project's effects on fish and fish habitat, including aquatic invertebrates and special status species, including the advice and comments of the expert departments, First Nations consulted and the public.

5.4.1 Description of the Component "Fish and Fish Habitat, Including Aquatic Invertebrates"

The analysis of the effects on "fish and fish habitat," including aquatic invertebrates, considers fish and fish habitats, such as spawning grounds and rearing, growth and feeding areas, as well as aquatic invertebrates and their habitats. The Agency considered the fish and aquatic species listed in Schedule 1 of the *Species at Risk Act* or for which the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) recommends a status under the *Species at Risk Act*. The species designated or likely to be designated under Quebec's *Act respecting threatened or vulnerable species* were also considered.

Description of Fish and Invertebrate Aquatic Habitat

The study area selected by the Proponent to assess the effects of the Project on fish and fish habitat, including aquatic invertebrates, is the extended study area (Figure 3, Chapter 1). The Project is located in the estuary, in the last portion of the river to be influenced by freshwater tides, which are semi-diurnal with very high amplitude. The Proponent described the principal aquatic ecosystems found in the work site area by separating them as follows: Baie de Beauport, beach, the estuary of the St. Charles River, the main channel of the St. Lawrence River and the wharf, the area behind the wharf and dredging area (Englobe, 2020h).

Baie de Beauport is characterized by weak currents varying according to the tides and by a shallow depth (Englobe, 2020h). According to the Proponent, it forms a significant, dynamic and unique feeding and growth habitat, because it is mostly sheltered from the river's main currents, subject to high tides, rich in nutrients and consisting of fresh water and submerged and emergent vegetation. This would be a rare situation in the river between the estuary and the river section (Englobe, 2017).

At the end of Wharf 53, a sand-shingle beach extends to the southwest embayment[27]. The aquatic area of the beach generally has no aquatic vegetation. According to the Proponent, the longshore currents induced by the tides favour the drift of larvae and young fish and probably allow them to reach the calmer water area of Baie de Beauport (Englobe, 2020h).

The mouth of the estuary of the St. Charles River, which flows directly into the work site area, is a dynamic environment and the strength and direction of the current speed vary significantly depending on the tides. A small whitewater spawning ground used by walleye in spring is found at the foot of the dam (Englobe, 2020h). The habitat of the estuary of the St. Charles River is composed of a deep and wide area at its mouth and a narrower and shallower area further upstream. A special aspect of the estuary of the St. Charles River is the presence of a circular current (gyre) induced by the tidal currents in the river. This gyre is probably the origin of the great abundance of young fish of several species, including striped bass and American shad (Englobe, 2020h).

The main channel of the St. Lawrence River is composed of a bare substrate subject to significant variations of current speed and direction. The depths are significant and aquatic vegetation is absent (Englobe, 2020h).

Finally, the wharf area, the area behind the wharf and the dredging area consist of sand, gravel, pebbles and shingles. More specifically, the topography of the river bed of the dredging area is highly variable, with a deeper area upstream, followed by a shallower portion. The hydraulic features of this area are special. The river and tidal currents create a rotary current and a shear area[28] (Englobe, 2020h).

The subaquatic noise environment of the extended study area is influenced by noise sources that vary during the year, particularly by recreational navigation in summer and ice noise in winter. Commercial navigation and port activities extend year round and are the main source of anthropogenic noise in the study area (Englobe, 2018c).

Fisheries and Oceans Canada is of the view that the entire Beauport sector forms a sensitive environment offering a complete set of habitat functions (breeding, rearing, feeding, shelter) suitable for several fish species and is especially important for fish, due to its strategic location, its complementary habitats and its rarity in the St. Lawrence River Estuary.

Description of Aquatic Wildlife (Fish and Aquatic Invertebrates)

The description of aquatic wildlife (fish and invertebrates) in the extended study area was produced from the existing documentation and completed by several characterization studies conducted by the Proponent between 2013 and 2019. According to the Proponent, a total of 43 species were captured, including American shad, yellow perch, white sucker and white perch (Englobe, 2020h). Fisheries and Oceans

[27] The southwest embayment corresponds to the narrower part of the Baie de Beauport where the tides flow into the Du Moulin Stream.

[28] Area where two forces are exerted parallel to each other in opposite directions

Canada is of the view that the inventories conducted and the distribution of fish species presented by the Proponent are valid.

The Proponent analyzed the potential presence of special status fish species (Appendix 8.1 of Englobe, 2018b) and identified five species present in the work site area (Table 11) (Englobe, 2020h).

Table 11: List of special status fish species under federal and provincial legislation

Species		Situation		
Vernacular name	Scientific name	SARA (1) (Schedule 1)	COSEWIC (2)	LEMV (3)
Striped Bass St. Lawrence River population	*Morone saxatilis*	Endangered	Extinct (original population) (4)	Not listed
American shad	*Alosa sapidissima*	Not listed	No information	Vulnerable
Atlantic sturgeon, St. Lawrence population	*Acipenser oxyrinchus*	Not listed	Threatened	Likely to be designated as threatened or vulnerable
Lake sturgeon, Great Lakes and Upper St. Lawrence population	*Acipenser fulvescens*	Not listed	Threatened	Likely to be designated as threatened or vulnerable
American shad	*Anguilla rostrata*	Not listed	Threatened	Likely to be designated as threatened or vulnerable

Source: Englobe, 2020h

(1) *Species at Risk Act*
(2) Committee on the Status of Endangered Wildlife in Canada
(3) *Loi sur les espèces menaces et vulnérables*
(4) COSEWIC plans to reassess the status of all striped bass populations in 2022, including the one reintroduced into the St. Lawrence River

Striped Bass St. Lawrence River Population

The historical indigenous striped bass population of the St. Lawrence River was decimated in the late 1960s. Starting in 2002, individuals from the Miramichi River in New Brunswick were introduced into the St. Lawrence River. Since 2011, the St. Lawrence River population, which is the subject of a recovery strategy, is listed as an “endangered” species in Schedule 1 of the *Species at Risk Act*. The recovery plan for the species seeks to restore a striped bass population capable of reproducing and sustaining itself in the St. Lawrence Estuary and of integrating itself into the biological community without disturbance (Robitaille

et al., 2011). A new version of the recovery strategy was proposed in 2019 and the public consultation on this strategy ended in September 2019 (Fisheries and Oceans Canada, 2011, proposed version). This recovery strategy is not final or approved.

In December 2019, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) reassessed the situation of the historical indigenous striped bass population of the St. Lawrence River and assessed its status as “extinct”, because the newly established fish do not come from the historical population of the St. Lawrence River. The COSEWIC recommends that the situation of the population present in the St. Lawrence be assessed. The COSEWIC also plans to reassess all of Canada’s striped bass populations by 2022. In the absence of a change of legal status of the striped bass population present in the St. Lawrence under the *Species at Risk Act*, the recommendations of the Recovery Strategy for the striped bass are still valid.

The striped bass population present in the St. Lawrence River uses the Project site and the St. Lawrence River from Gentilly, located upstream from the Project site, to Rivière-Ouelle, on the south shore of the River, and up to and including the Saguenay Fjord on the north side. Several sightings have been reported beyond this area and overlap, downstream, with the distribution of the Gulf of St. Lawrence population (Fisheries and Oceans Canada, 2019).

The Proponent made significant inventory efforts to describe the use of the extended study area by striped bass. Thus, since 2015, the Proponent has conducted several field operations to document the spawning activities, use by juveniles and movement of striped bass (telemetric monitoring). According to the Proponent, data suggests that the striped bass that gather in Baie de Beauport use a large area (280 hectares) opposite the southwest tip of Baie de Beauport. The telemetric monitoring has also allowed the Proponent to identify four potential spawning areas. The biggest would be located upstream from the outlet of Lake St. Pierre. The second biggest would be at the mouth of the watershed of the South River at Montmagny and two secondary spawning grounds would be found in the river section between Québec City and the outlet of Lake St. Pierre and in the Beauport sector.

In support of this hypothesis, the Proponent submitted in December 2020 the results of a field campaign carried out in 2020 to confirm the spawning of striped bass upstream of Québec City, particularly in areas of the Richelieu River (downstream of the Saint-Ours threshold) and the river section between Bécancour and Cap-Rouge. According to the Proponent, the work carried out not only confirms the presence of breeding activities upstream of Québec City, but also allows, because of the presence of young of the year fish, to relativize the importance of the Beauport Bay spawning site (Englobe, 2020z).

Contrary to the Proponent, Fisheries and Oceans Canada considers the end of the Beauport Peninsula to be a very important breeding area for the striped bass St. Lawrence River population, in particular due to its intensive use and rarity. This finding is based on the data gathered by Quebec's Ministère des Forêts, de la Faune et des Parcs, which confirms that a striped bass spawning ground is located on the Laurentia Project site (L’Italien *et al*., 2020). To date, only the Beauport site and the watershed of the South River at Montmagny are recognized as important for breeding and as capable of contributing significantly to the growth of this population. Despite signs of spawning upstream of Québec City, it is unknown for the time being whether these spawning activities contribute significantly to the reproduction of the striped bass

population. According to the Ministère des Forêts, de la Faune et des Parcs, the data and information available to date suggest that eggs and larvae produced upstream in the St. Lawrence River have a reduced chance of survival. Their production would therefore have little influence on the striped bass population dynamics (L'Italien et al., 2020). Fisheries and Oceans Canada considers that the entire shallow area of Baie de Beauport corresponds to good-quality habitats for the growth of young striped bass.

With regard to the most recent field campaign conducted by the Proponent, Fisheries and Oceans Canada believes that the presence of larvae noted by the Proponent is marginal in all the locations sampled. The number of young of the year fish is also low between Sorel and Lévis, considering the research efforts made and in comparison to the more abundant catches made just downstream from the Beauport spawning area. The low abundance of larvae and young of the year fish noted by the QPA, coupled with conditions consistent with poorer quality rearing habitat, still suggests that the contribution to recruitment may be low upstream of Québec City, particularly in the sector upstream of Trois-Rivières.

American Shad

The American shad is a fish that is born in fresh water, migrates to the marine environment where it reaches maturity, and returns to fresh water to breed. In Quebec, it is found from the Upper St. Lawrence to the Gulf during the migration period. In the spring, it ascends the Estuary to reach the spawning grounds[29].

With respect to this species' use of aquatic habitats, the Proponent concludes that it is unlikely that a spawning area is in the work site area. However, there are several signs that suggest spawning activities occur in the immediate vicinity of Wharf 53. Fisheries and Oceans Canada also assesses that the proposed backfill site presents a significant habitat function related to the American shad's reproductive process, including congregations of breeding individuals. Such sites would be rare in this portion of the St. Lawrence Estuary based on current information.

According to the Proponent, Baie de Beauport and the shallow sectors of the estuary of the St. Charles River constitute a feeding and growth habitat for young American shad (Englobe, 2020h). Fisheries and Oceans Canada considers that the rearing habitats located at the tip of the port peninsula are particularly important because of the sustained catches made during the inventories conducted by the Proponent.

Lake Sturgeon and Atlantic Sturgeon

The distribution of the lake sturgeon, Great Lakes and Upper St. Lawrence population, extends from the Great Lakes to Saint-Roch-des-Aulnaies, about 125 kilometres east of Québec City (Moisan and Laflamme, 1999). The Atlantic sturgeon population of the St. Lawrence is mainly found east of Trois-Rivières as far as

[29] Taken from Liste des espèces fauniques menacées ou vulnérables au Québec, Ministère des Forêts, de la Faune et des Parcs https://www3.mffp.gouv.qc.ca/faune/especes/menacees/fiche.asp?noEsp=10&_ga=2.113391687.1337332116.1600279378-1333823922.1599741986

the Estuary and also extends beyond the Gulf of St. Lawrence (Species at Risk Public Registry, 2020). Thus, in the part of the St. Lawrence downstream from Trois-Rivières, these two species share the same territory.

Following fieldwork, the Proponent observed that lake sturgeon used the estuary (juveniles and adults) and the mouth (juveniles) of the St. Charles River, Baie de Beauport (juveniles) and the underwater embankments located on both sides of the river (juveniles and adults). However, no breeding would be present in the work site area (Englobe, 2020h).

For the Atlantic sturgeon, the juveniles use the entire estuary of the St. Charles River at a stratum depth ranging from 10 to 20 metres. The mouth of the estuary and the underwater embankment on the left bank of the main channel are also used. The adults seem to prefer the relatively deep sectors (between 20 and 50 metres) (Englobe, 2020h).

According to Fisheries and Oceans Canada, and based on the Proponent's data, the estuary areas of the St. Charles River, including those that would be backfilled and dredged for the Laurentia Project, are important for the feeding and movement of juveniles and adults of the two sturgeon species.

American Eel

In Canada, the American eel is found in all fresh water, estuaries and marine waters that have access to the Atlantic Ocean, from Niagara Falls in the Great Lakes to the middle of the Labrador coast (Species at Risk Public Registry[30]).

According to the Proponent, the majority of the migrating eels in the Project sector use the channel south of Île d'Orléans. The estuary of the St. Charles River would be an inhospitable habitat for the species. Thus, the eels detected in the estuary of the St. Charles River would be in passage or would stay there for short periods. The Proponent suggests that the area used by certain eels before they enter brackish water would consist of a large sector, including the portion of the river between Québec-Lévis and Île d'Orléans (Englobe, 2020h). Fisheries and Oceans Canada has not raised any concerns about this species.

Aquatic Invertebrates

According to the Proponent, the substrate of the deep-water area of the estuary of the St. Charles River is colonized by benthos, mostly bivalves, followed by amphipods and oligochetes (worms). These species constitute prey sought by the lake sturgeon and the Atlantic sturgeon. The area near Wharf 53 is composed of more diversified benthic fauna than the estuary of the St. Charles River (Englobe, 2020h).

[30] https://species-registry.canada.ca/index-en.html#/speices/891-632

Inventories were produced for freshwater mussels in the areas at risk of being affected by the work to verify the presence of four special status species, the alewife floater, the elephantear, the spike and the hickorynut (Table 12).

The vast majority of the mussels observed were invasive species. The indigenous mussel species identified during the inventories include the eastern elliptio, the eastern lampmussel, the plain pocketbook and the black sandshell. No living freshwater mussel with species at risk status was found in the sampled area. However, one empty shell valve of the hickorynut was found, as well as another one with a morphology similar to the elephantear. According to the Proponent, the presence of these shells would not be an indication that living special status mussels are present in the work site area or its immediate perimeter.

According to Fisheries and Oceans Canada, the hickorynut is present in this sector of the St. Lawrence River. The physical habitat conditions identified at the work site are hospitable to the presence of the species. Thus, it is possible that the inventories carried out by the Proponent did not detect the presence of the species, particularly in the presence of individuals buried at certain stations (especially the juvenile stages). Fisheries and Oceans Canada therefore considers that the hickorynut is potentially present in the work site area.

Table 12: List of special status freshwater mussel species

Species		Situation		
Vernacular name	Scientific name	SARA (1) (Schedule 1)	COSEWIC (2)	ATES (3)
Alewife floater	*Anodonta implicata*	Not evaluated	Not evaluated	Likely to be designated as threatened or vulnerable
Elephantear	*Elliptio crassidens*	Not evaluated	Not evaluated	Likely to be designated as threatened or vulnerable
Spike	*Elliptio dilata*	Not evaluated	Not evaluated	Likely to be designated as threatened or vulnerable
Hickorynut	*Obovaria olivaria*	Endangered	Endangered	Likely to be designated as threatened or vulnerable

(1) *Species at Risk Act*,
(2) Committee on the Status of Endangered Wildlife in Canada
(3) Act respecting threatened or vulnerable species

5.4.2 Analysis of Potential Effects and Proposed Mitigation Measures

According to the Proponent, construction and placement of the reinforced concrete caissons, the wharf, the area behind the wharf and the containment dike, construction and operation of a concrete plant, dredging and management of the sediments, management of the soil and runoff water, extension of the outfalls and consolidation of the soil would result in effects on the aquatic fauna during the construction phase. An increase in the subaquatic noise level, suspended particulate matter, fine particle sediment and nocturnal light intensity would be expected. This could have effects on the breeding, rearing and migration functions of the aquatic fauna. During the operational phase, the presence of the wharf and the area behind the wharf, including the visual and acoustic screen, port operations, management of runoff water and wastewater, marine traffic, maintenance dredging and sediment management could have effects on the aquatic fauna, including permanent habitat loss for aquatic fauna (Englobe, 2020h).

Destruction and Permanent Alteration of Fish and Aquatic Invertebrate Habitat

According to the Proponent, the Project would generate a permanent loss of 12.8 hectares of aquatic habitat due to encroachment by the terminal. The Project would also permanently modify 8.6 hectares of habitat, including 7.7 hectares in the dredging area and 0.9 hectare at the location planned for the containment dike. A total of 21.4 hectares of habitat would be affected by the Project (Englobe, 2020h). The Proponent anticipates little change in the composition and characteristics of the fish populations in general after the Project, because for the species not at risk, no key habitat or habitat judged essential would be affected. For the walleye spawning ground at the foot of the Joseph-Samson Dam, the Proponent does not foresee significant effects that are likely to affect it.

According to the Proponent's analysis, the potential effects in the operational phase on the fish species at risk would affect the juvenile Atlantic sturgeons and adult and juvenile lake sturgeons that primarily use the estuary of the St. Charles River as a feeding habitat. The striped bass and American shad rearing habitats in the estuary of the St. Charles River and Baie de Beauport, as well as the striped bass spawners whose spawning area includes the footprint of the wharf, the area behind the wharf and the dredging area, would also be affected (Englobe, 2020h).

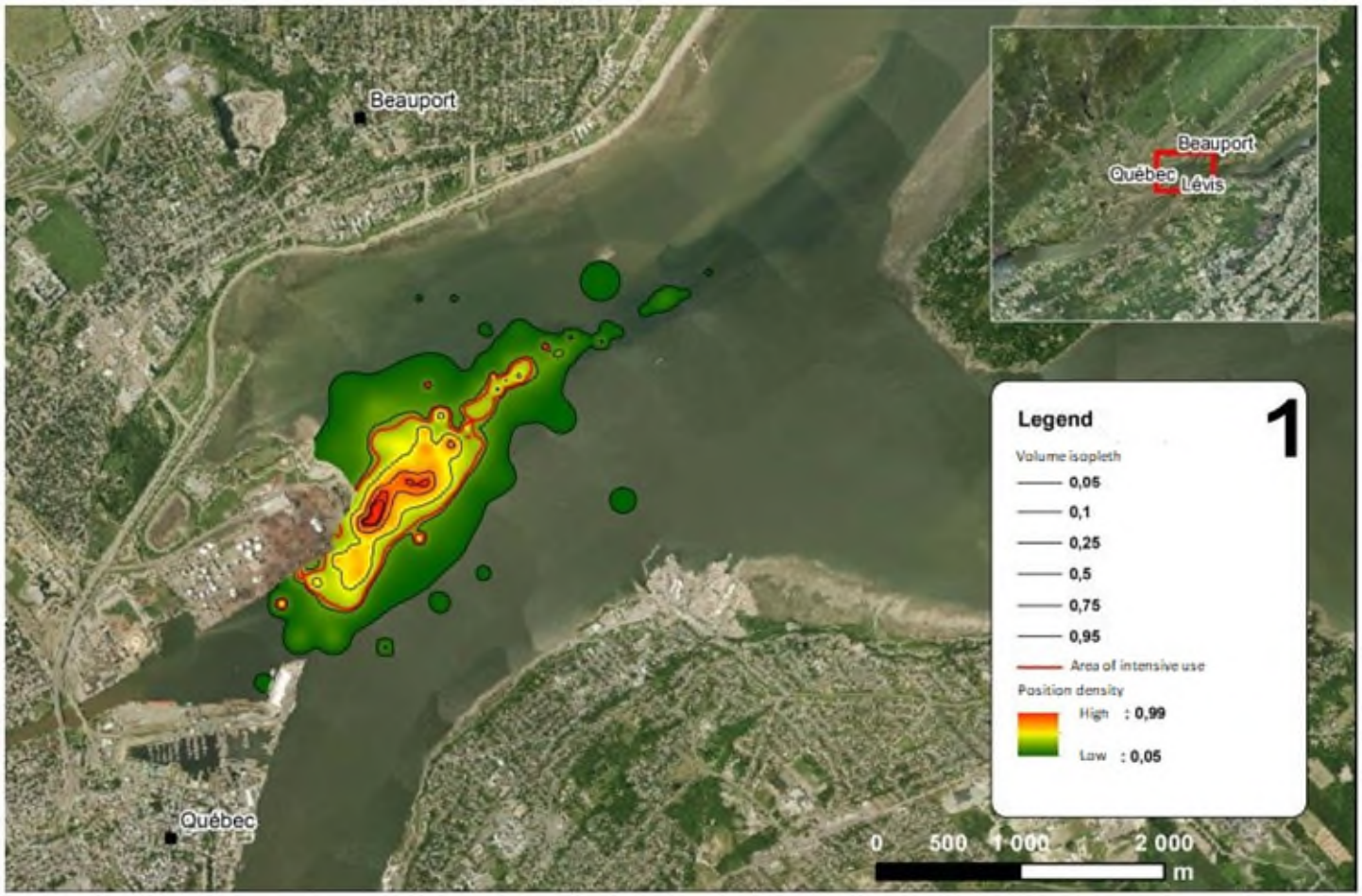
Fisheries and Oceans Canada considers that the location of the habitats and description of the use of the habitats carried out by the Proponent are deficient. Its interpretation of certain habitat functions, particularly for the striped bass, the lake sturgeon, the Atlantic sturgeon and the American shad, biases its analysis of the Project's environmental effects.

According to Fisheries and Oceans Canada, the area of the Projected wharf, located both in Baie de Beauport and the estuary of the St. Charles River, would affect one of the two breeding habitats identified to date for the striped bass, feeding and movement areas confirmed for lake sturgeon and Atlantic sturgeon juveniles and adults, rearing areas used in particular by striped bass, American smelt and American shad, as well as important habitats playing a role in the reproductive process of the American shad (congregation

of spawners). An important growth habitat for the Atlantic sturgeon and lake sturgeon juveniles would also be affected by the Project.

Based on available information, including a recent report by the Quebec's Ministère des Forêts, de la Faune et des Parcs on the *Dynamics and breeding habitats of the reintroduced striped bass population* (L'Italien *et al*., 2020), Fisheries and Oceans Canada finds that all of the Project's backfill and dredging areas are located in the area used intensively for striped bass breeding. Fisheries and Oceans Canada also notes that a gradient of increasing use is observed as one leaves the periphery of the home range identified for reproduction and approaches the tip of the harbour peninsula (Figure 8). Figure 8 illustrates the density of striped bass frequenting the Project site during the spawning period. The more the colour tends towards red, the more the density of striped bass increases. The Project would thus completely destroy an area of higher reproductive use at the Beauport site. This zone of high use corresponds to a small area located directly at the tip of the port end and encompasses a significant proportion of the individuals' locations in a very small area of the overall home range.

Figure 8: Illustration of the core density of the group of striped bass frequenting Beauport Bay and the Project site during the reproduction period (May 12 to June 26) from 2015 to 2018.



Source: L'Italien *et al.*, 2020 (Traduction made by the Agency)

Fisheries and Oceans Canada also finds that according to the results of the Proponent's hydrodynamic and sediment studies, the Project would modify the hydrodynamics of the bodies of water over large areas. The Project would generate significant accelerations and reductions of the current speeds depending on certain tidal phases, over large areas located in the striped bass breeding habitat. These changes would cumulatively affect nearly 50 hectares of the overall area that can be used by the striped bass for breeding in the area, including the entire area of intensive use. According to Fisheries and Oceans Canada, the reproductive success of the striped bass (fertilization of eggs, maintenance of the eggs in the water column, etc.) directly depends on favourable hydrodynamic conditions that attract the species' spawners. Fisheries and Oceans Canada indicates that it is difficult to assess precisely the effects these changes could have on the conditions of attraction and the quality of the area for striped bass breeding, but considers these hydraulic changes would add uncertainties and risks that could contribute to the destruction of the area most intensively used for striped bass breeding. The risk that the use of the Beauport site by striped bass spawners will be greatly diminished or become uninteresting for the species would also be increased. Moreover, the hydraulic conditions favouring congregation of striped bass are unknown and there is no reason to affirm that the impact of this change to the flow on striped bass activities will be low or negligible.

According to Fisheries and Oceans Canada, dredging and backfilling would involve the significant loss of feeding and movement habitats for lake sturgeon and Atlantic sturgeon over an area of 21.4 hectares. The Project would also involve localized changes to the hydrodynamics of the bodies of water, which could influence the hydrosedimentary regime favourable to the benthic fauna that are part of the diet of the sturgeon species. These changes will be notable (particularly the speed accelerations) in certain areas and during certain tidal phases. Although it is difficult to assess the impact these changes could have on the quality of the habitats affected, Fisheries and Oceans Canada considers that they would be added to all the threats that already exert pressure on these fragile populations.

Fisheries and Oceans Canada assesses that the Project would destroy shallow, good-quality rearing habitats for American shad over approximately 4.5 hectares and nearly 660 linear metres of shoreline. The Project would also destroy a large area linked to the breeding process for this species, including congregations of spawners. According to the current information, these sites appear to be rare in this portion of the St. Lawrence Estuary. These habitat losses for the American shad would be added to all the threats that already exert pressure on this fragile population, which could favour a population reduction.

Due to the physical habitat characteristics and the number of young of the year fish that were captured by the Proponent in 2013, particularly at the proposed backfill site, Fisheries and Oceans Canada considers that a rearing area of approximately 2000 square metres for American smelt would be destroyed by the proposed backfill.

Finally, because uncertainties persist regarding the inventories conducted to determine the presence of hickorynuts, Fisheries and Oceans Canada considers that, if the species is present, mortality could occur due to riverbed encroachments and dredging and habitat loss for this species, which would be added to the other losses and permanent alterations of fish habitat. However, the adverse impacts on the species could be avoided by relocating the hickorynuts before the work and thus avoiding individual mortality. Thus, should

the Proponent obtain an authorization under the *Species at Risk Act*, Fisheries and Oceans Canada could require additional surveys prior to the work in order to relocate any individuals that would be detected.

The Proponent developed an offset program whose most recent update was presented in March 2021 (Englobe, 2020aa). This program may be required as part of the application of the *Fisheries Act* to offset the effects of the destruction and alteration of fish habitat that is intended to provide similar or higher quality foraging habitat. It also proposes specific developments to improve the habitats of young of the year striped bass and young of the year American shad. Finally, it seeks to ensure that the Project's effects are positive or at least counterbalance the Project's adverse effects on the striped bass population. However, the Proponent admits that it is complex and uncertain to offset the loss of spawning areas for a pelagic species like the striped bass. For this reason, the Proponent proposes to develop rearing areas to improve the species' recruitment success and habitat productivity. To mitigate the uncertainties related to the loss of spawning areas, the Proponent also suggests a scientific research program to acquire knowledge of the population present in the St. Lawrence River (Englobe, 2020h).

Fisheries and Oceans Canada has reviewed the documentation submitted by the Proponent and considers that some of the offset proposals are relevant to offset the loss of certain habitats, including those used by striped bass and American shad in their young life stages, as well as those used for feeding by common species. However, Fisheries and Oceans Canada specifies that the impossibility of replacing other habitats in their entirety could have significant consequences for several species. High risks of permanent habitat losses persist, particularly for the reproduction of striped bass and American shad and for the feeding and movement of both sturgeon species (juveniles and adults). The option of directing offset to other habitat functions, other species or research programs would expose these sensitive populations to significant negative impacts.

Consequently, Fisheries and Oceans Canada considers that the offset program proposed by the QPA would not, under the *Fisheries Act*, adequately offset many of the lost habitats, given their rarity, complexity, high value, high use and advantageous location in the St. Lawrence Estuary. Nor would it ensure the survival or recovery of the striped bass, a species protected under the *Species at Risk Act*.

The Ministère de l'Environnement et de la Lutte contre les changements climatiques (MELCC) believes that the Project in its current form is not in line with the *Politique de protection des rives, du littoral et des plaines inondables* (PPRLPI) since it aims at increasing the storage space of goods within the waterway. It also considers that this work affects aquatic wildlife habitats with high potential for special status species managed by Quebec: American shad, Atlantic and lake sturgeon, American smelt and striped bass. Finally, the MELCC notes that the sites targeted by the Proponent for offset projects raise concerns for the Ministère du Transport du Québec (MTQ). According to the MTQ, certain projects could be in major conflict with the objectives of the master plan of the Littoral Est project led by the MTQ, the Commission de la capitale nationale and Québec City.

Some First Nations, including the Mohawk Nation of Kahnawà:ke and the Grand Council of the Waban-Aki Nation, shared concerns about the effects the Project could have on the migratory species, such as the striped bass, the lake sturgeon, the Atlantic sturgeon and the American shad, which are prized and fished by their communities. They are also concerned about the choice and effectiveness of the offset projects that

would be implemented to counterbalance the habitat losses. They believe that the proposed measures (Englobe, 2020r) would not be sufficient to offset the value of the lost habitats. In the event that a *Fisheries Act* authorization is issued, offsetting measures considered sufficient by the Department of Fisheries and Oceans Canada would be required.

The Grand Conseil de la Nation Waban-Aki points out that the Project's location means that it will have significant negative impacts for the health and recovery of the striped bass population and for the health and certain migratory fish populations, including the sturgeon. The striped bass is also a prized species, whose recovery could support a fishery in the portion of the St. Lawrence River included in their customary territory. The Mohawk Council of Kahnawà:ke indicates it is concerned about the potential reduction of migratory species populations, such as the lake sturgeon, the striped bass and the American shad, at traditional sites following the construction and operation of the terminal.

Members of the public questioned the need for extensive backfilling in the St. Lawrence River to create container storage space, among other things. Several citizens, environmental conservation organizations and certain First Nations, such as the Grand Council of the Waban-Aki Nation, believe that backfilling and dredging in a sector defined as a striped bass breeding area would go against the efforts made over the past few decades to reintroduce this species into the river. According to many, carrying out a major dredging operation would be a major mistake for the conservation of striped bass considering that this activity could be one of the main causes of its disappearance in the 1960s. Members of the public are concerned that the loss of habitat caused by the Project threatens the survival of the species in the river.

Water Quality Changes Related to Dredging and Sediment Management

Dredging Activities During the Construction Phase

In all, approximately 453,229 cubic metres of sediment, including 24,933 cubic metres of contaminated sediment, would be dredged in the aquatic environment over a two-year period in the manoeuvring and mooring area and in the construction area of the new Wharf 54. According to the Proponent, the increase in suspended particulate matter, mainly due to dredging, could temporarily alter the water quality and the fish habitat, including rearing and growth areas of the young fish. Sedimentation of fine particles could cause clogging of the spawning areas and thus compromise the survival of the eggs. Suspension of particles in water could induce fish to avoid the work area and affect filtering aquatic organisms, such as freshwater mussels.

The baseline sediment status is based on the integration of the results of numerous characterizations carried out since 2012 (Englobe, 2018e). In summary, the Proponent has identified two classes of sediments, "uncontaminated" and "contaminated". Sediments that present, for at least one contaminant, a concentration equal to or greater than the Occasional Effect Concentration (OEC) of the assessment guide Criteria for the Evaluation of Sediment Quality in Quebec and Application Frameworks: Prevention, Dredging, Restoration (Environment Canada and Ministère du Développement durable, de l'Environnement et des Parcs, 2007) are considered contaminated and will be dredged and managed separately from non-contaminated sediments. The Proponent has also established a relationship between the granulometry and colour of

sediments and their level of contamination (Englobe, 2018e). Thus, finer sediments (mainly limestone or silt) have a black colour and higher levels of contamination than coarser sediments, which are mainly sand and beige in colour. The Proponent considers that additional surveys would be necessary only to confirm the absence of butylitans in the area of wharf #53 (Englobe, 2020k). The MELCC specifies that the collection and analysis of at least three samples should be required.

Environment and Climate Change Canada is of the opinion that the description of the baseline condition is adequate. The sediment characterizations carried out are considered representative (number of characterizations, depths covered and number of samples collected). Environment and Climate Change Canada considers the approach used by the Proponent to estimate the volumes of contaminated sediments and to differentiate between “contaminated” and “non-contaminated” sediments to be conservative. This would help reduce the environmental risk associated with the proposed dredging operations. With respect to the results of the contaminated sediment characterizations, Environment and Climate Change Canada is of the opinion that the contamination is generally not of concern for all the sediments to be dredged, although some areas show significant localized contamination.

To reduce the Project’s effects and ensure a certain efficiency during dredging, the Proponent would prefer hydraulic dredging for uncontaminated sediment and mechanical dredging for the surface layer, the contaminated sediments and the sediments around the contaminated sediments. Hydraulic dredging limits the amount of sediment re-suspended in the water column while mechanical dredging allows for greater accuracy. The Proponent proposes to include a 30-centimetre buffer zone around the dredged area when it contains contaminated sediment, to prevent it from being dredged and managed as non-contaminated sediment. Mechanical dredging would also allow monitoring to validate the colour and granulometry of the dredged sediment, characteristics that are highly correlated with contamination levels.

Environment and Climate Change Canada is of the opinion that the choice of dredging techniques and the methodology proposed by the Proponent are appropriate to reduce the risk of environmental effects. However, it is possible that the excavation of sediment, contaminated or not, may expose underlying contamination that would not have been identified during the various characterizations. To mitigate this uncertainty, Environment and Climate Change Canada recommends that the Proponent conduct a follow-up on the quality of sediment that would be exposed by dredging to ensure their safety and plan corrective measures if necessary. Should such contamination be discovered, solutions such as complete removal by additional dredging or dredging and then capping of the residual contaminated area should be considered.

The Proponent proposes several mitigation measures to reduce the emission of suspended solids and wishes to limit dredging operations to the minimum necessary (Englobe, 2020r). The Proponent also proposes that no dredging activities be carried out during the striped bass spawning period, which according to the Proponent takes place from May 18 to June 15, nor during the period when an increased presence of young of the year fish has been observed, i.e., from July 1 to 30. Fisheries and Oceans Canada and the MELCC are recommending a longer restriction period. Fisheries and Oceans Canada recommends that in-water works be carried out outside the sensitive period for fish including striped bass, Atlantic and lake sturgeon, American shad and American smelt. The work should be carried out between October 1 and April 30 and their duration in the aquatic environment should thus be limited to the minimum.

During dredging activities, real-time monitoring of the suspended solids generated by the Project in the aquatic environment is planned using two turbidimeters. The data would be validated on a daily basis at punctual sampling points. These turbidimeters would also be used to monitor suspended solids during the backfilling of the backshore, the filling and use of geotextile tubes, and the dismantling of the uncontaminated sediment settling pond. The results of these turbidimeters would be compared to the turbidity values established prior to the work (in 2020) to determine the level of suspended solids in relation to the reference state of the aquatic environment. This reference state would be represented by a curve describing the relationship between turbidity values obtained in the laboratory and their suspended solids concentrations (TSS-Turbidity curve). Environment and Climate Change Canada recommends that the calibration of this curve be completed on-site (*in situ*) during the work to ensure that the reference state of the site is taken into account during construction activities. In the event that predetermined alert thresholds are exceeded, the Proponent would implement intervention mechanisms to reduce the risk of adverse effects on aquatic fauna and its habitat. Turbidimeters would be moved in real time during construction to document possible increases in suspended solids. For validation purposes, three conventional turbidimeters would be installed in areas outside the influence of dredging. Recorded measurements would be collected monthly and would be used to validate or interpret, a posteriori, the data from the continuous monitoring of the two main turbidimeters. Environment and Climate Change Canada recommends that the Proponent evaluate the possibility of replacing the three conventional turbidimeters with continuously linked turbidimeters to facilitate the explanation of exceedances of criteria at the work site, or allowing for more rapid corrective measures. (Englobe, 2020k).

Finally, should alert thresholds be exceeded, the Proponent would put in place intervention mechanisms to reduce the risks to the aquatic environment. Contingency mechanisms are also provided for in the event of accidental discoveries of contaminated sediment (Englobe, 2020k).

Sediment Management During Construction

Uncontaminated sediment (with all parameters below the “concentration d’effets occasionnels” (CEO)) dredged by hydraulic dredging would be sucked and pumped as sludge into the sediment settling pond located at the location of the back wharf. According to the Proponent, this pond would have the capacity to settle the entire volume of dredged sludge, thus limiting the suspended solids in the dewatering water. A spillway system would allow this water to be sampled prior to its return to the receiving environment to ensure that it meets the discharge criteria established in consultation with Environement and Climate change Canada and the Ministère du Développement Durable, de l’Environnement et de la Lutte contre les changements climatiques. This sediment, once dewatered, would be used as backfill material in the backwater (Englobe, 2020k).

Part of the uncontaminated sediment settling pond would be constructed with geotextile tubes filled with the upper portion of the soil excavated on the site, as needed. The water that would percolate from these tubes would flow into the environment, which could lead to degradation of the water quality of the river if the soil used were contaminated or if suspended particulate matter escaped. However, the Proponent does not anticipate effects on the receiving environment because no contaminated soil would be used, the soil that would be used is coarse, and the suspended particulate matter should be filtered by diffuse flow on the

beach separating the pond from the river. The Proponent does not envision measures to collect and treat the percolation water. In the event of a failure leading to emission of suspended particulate matter during filling of the geotextile tubes, the Proponent foresees that the monitoring stations for suspended particulate matter in the aquatic environment would allow detection of any increase exceeding the limits associated with the receiving environment. In case this happens, mitigation measures would be deployed (Englobe, 2020k and Englobe, 2020r).

The uncontaminated sediment settling pond would be developed near the river at a site potentially contaminated by stockpiling of contaminated soil. To ensure the quality of the soil underlying the piles, the Proponent foresees characterization up to the lowest elevation for the pond before the soil is excavated. If contamination is present, this soil would be sent off site for disposal and clean soil would be used to fill the geotextile tubes (Englobe, 2020l).

The contaminated sediment would be placed in a dewatering pond constructed to avoid contamination of the soil and runoff water. Once dewatered, sediment will be managed off site according to the regulations in force. The water from the dewatering pond would be directed to a mobile unit designed to comply with Québec City's municipal requirements for discharge into the sanitary sewer. The monitoring program includes sampling of these waters to verify compliance with Québec City's sanitary sewer discharge by-law. In the event of non-compliance with this regulation, the Proponent plans to add a mobile treatment unit that will be used to pre-treat problematic parameters in the dewatering pond water prior to its discharge into the municipal sewer (Englobe, 2020k).

Environment and Climate Change Canada considers the addition of a mobile treatment unit to be an important improvement to ensure that the water from the dewatering pond for the contaminated sediment would not affect the quality of the water discharged and complies with Québec City's sanitary sewer discharge by-law, especially. This unit could be adjusted according to the results obtained during the analysis of its effluent. The MELCC confirms that compliance with the requirements of the Québec City regulation would allow for the proper management of water from the contaminated sediment recovery basin.

To ensure that dewatering of the contaminated sediment does not affect groundwater, the Proponent plans to monitor groundwater quality by the use of observation wells (existing or to be installed). A characterization of the land receiving the dewatering pond would be performed before and after the work to confirm that it had no effect on the soil in place and restore the site to it initial condition, as applicable (Englobe, 2020l).

Finally, the dismantling of the contaminated sediment dewatering basin would be done in a sequence that would reduce the risk of contamination of the existing soil. The materials in this basin would be transported and used as backfill in the backshore (Englobe, 2020k). According to the Proponent’s various studies, these materials could come from the land that would likely be contaminated, or from clean materials imported from a quarry. Environment and Climate Change Canada is of the opinion that under no circumstances should materials or soils forming the foundation of the contaminated sediment dewatering basin be sent to the back wharf to be mixed with non-contaminated sediment in order to avoid contamination of the receiving environment.

Dredging and Sediment Management in the Operational Phase

During the operational phase, the vessel approach area will require maintenance dredging. This work would be subject to separate environmental impact assessments[31]. An on-site (*in situ*) characterization prior to dredging would be carried out to establish the nature and level of contamination of the sediment to be dredged and monitoring measures specific to each dredging operation would be established and implemented. The level of monitoring of the dewatering water quality of sediment from maintenance dredging would be dictated by the level of *in-situ* contamination of the sediment to be dredged. Contaminated sediment could be dewatered by various methods, but the Proponent would prefer to transfer the sediment directly to a truck or other watertight means of transport to an authorized site based on their environmental quality. The scenario where sediment would first be dewatered on-site is also considered by the Proponent. In this scenario, the dewatering water would be characterized and managed according to its environmental quality. If it meets Québec City's sanitary sewer discharge criteria, it could be discharged to the sanitary sewer. If the criteria are not met, the water will be pumped into a tanker truck and then disposed of in an authorized location in accordance with applicable regulations. If the sediment is not contaminated, the dewatering water could be discharged to the Proponent's storm sewer system for treatment by a settling pond or a hydrodynamic separator. Under this scenario, monitoring will be limited to validating that the dewatering water is directed to a management system to capture suspended solids (Englobe, 2020k).

Water Quality Changes Related to Soil and Groundwater Management

Concerning the soils in terrestrial environments, the presence, excavation, remediation and management of contaminated soils could result in contamination of surface or groundwater quality and thus end up in the aquatic environment. To determine how the soils to be remediated during the work should be reused or managed, environmental soil characterizations were carried out on the parcels or lands on which the work is planned. The Proponent compared contamination levels to the recommendations of the Canadian Council of Ministers of the Environment (CCME) and to the generic criteria for soils of Quebec's Ministère de l'Environnement et de la Lutte contre les changements climatiques du Québec (MELCC). More than 300,000 cubic metres of soil would be excavated, of which approximately 34,000 cubic metres have contaminant concentrations exceeding the limit values of the *Canadian Soil Quality Guidelines* (CSQG) – Industrial Use or MELCC "C" criteria. The Proponent commits to respecting the principle of non-degradation for the reuse of soil on the site and emphasizes that it would avoid any dilution or cross-contamination during the handling and transportation of contaminated materials. The Proponent also undertakes to characterize the soils to confirm that their environmental quality meets the requirements established for reuse on the site. No excavated soil will be reused in the back dock area or other areas near the high-water mark. Soil that cannot be reused on-site would be disposed of off-site according to current regulations (Englobe, 2020l).

[31] According to section 82 of the *Impact Assessment Act*, the Québec Port Authority, as a federal authority that manages federal land, must determine whether the projects proposed on federal land is likely to have significant effects before they are carried out. The entire area under the jurisdiction of the Québec Port Authority in the St. Lawrence River is on federal land.

Concerning the groundwater monitoring, the Proponent proposes to install six observation wells upstream hydraulically[32] of the new container handling, port operations and train loading facilities. Environment and Climate Change Canada points out that the groundwater table will extend through the sediment backfilled under the wharf before reappearing in the river, since the level of the backfill would be six metres above tidal level. Thus, the observation wells would not capture contaminants from the new facilities since the groundwater will flow towards the river and not towards the wells.

Environment and Climate Change Canada is of the opinion that the data generated by the sampling campaigns to determine soil and groundwater quality provides a good picture in the areas targeted by the work. Nevertheless, it recommends that soil characterization be improved or completed so that the number of samples are representative of the excavation and backfill areas confirmed with greater precision by the final plans and specifications. It also recommends that the Proponent install observation wells in the newly developed areas, in addition to those already proposed, in order to monitor groundwater in the extension of the water table.

Environment and Climate Change Canada is concerned about the risk associated with bringing contaminated soils closer to the aquatic environment, even if the level of contamination of these soils is below the CCME *Canadian Soil Quality Guidelines* (CSQG) thresholds. Indeed, the backfilling of contaminated soils on a portion of the site, even if they do not come into direct contact with groundwater, can be a potential source of contamination of groundwater and, indirectly, of surface water (river) by increasing the risk of contaminant migration in the soil. In accordance with the precautionary principle, Environment and Climate Change Canada is of the opinion that the Proponent should avoid bringing soils with concentrations of a substance above background levels into the aquatic environment.

Finally, the Proponent proposes to reuse without restriction on the Project site soils that contain substances with concentrations below CCME's CSQG for agricultural use. Environment and Climate Change Canada reminds the Proponent that these guidelines should rather be used as site remediation objectives and not as a threshold limit that could potentially increase the level of contamination on a site. Environment and Climate Change Canada recommends that the Proponent take into consideration local ambient soil concentrations in the receiving environment by, among other things, but not limited to, avoiding increasing contaminant concentrations in soils, even if soil quality is below the CCME *Canadian Soil Quality Guidelines* (CSQG) thresholds.

Water Quality Changes Related to Surface Water

The runoff water flowing onto the work site during the construction phase or onto the terminal during the operational phase could also affect the water quality of the aquatic environment if this water transports contaminants or suspended particulate matter. The existing land area where the redevelopment of Wharf 54 would take place is serviced by the Proponent’s existing stormwater system. The outfalls of this network flow into the St. Lawrence River or the St. Charles River estuary after passing through primary treatment equipment (retention of suspended particles) (Englobe, 2018b).

[32] “Upstream hydraulically” means a higher point in terms of groundwater flow.

During the construction phase, runoff would be controlled by temporary facilities set up at the start of construction and directed to the Proponent's stormwater system. At all times, the runoff water potentially in contact with suspended particulate matter that could be contaminated (presence of contaminated soil) would be recovered and transported to the contaminated sediment dewatering pond for treatment. During installation and use of the concrete plant, measures would be deployed to reduce the risks that particles (contaminated or not) end up in the runoff water (Englobe, 2020r). In particular, cleaning of the equipment used for production of concrete structures (caisson) would be performed in a dedicated washing area and the Proponent would require the contractor to deploy a process water management system (Englobe, 2020m).

The concrete caissons used for the construction of the dock line would be fabricated using forms placed on a submersible barge stored along Wharf 26 or along a spacer barge. These forms would be filled with concrete from concrete mixers parked at the edge of the wharf (Englobe, 2020m). Environment and Climate Change Canada is of the opinion that the Proponent should plan mitigation measures in addition to those already planned to limit the risks of concrete spills into the aquatic environment during the manufacture of these concrete caissons. Additional mitigation measures are justifiable given the quantity of concrete used to manufacture the caissons, the duration of the pour for each caisson (more than 24 hours), the complexity of the tasks performed and the river movements due to currents and tides.

Finally, a cofferdam would be deployed to recover the runoff water during excavation of the soil of the vegetated embankment. The water would be pumped into an emergency water accumulation pond to then be treated (Englobe, 2020m).

At the end of the construction work, the temporary installations would be dismantled so as to avoid the discharge of contaminants into the environment (water and soil) (Englobe, 2020m).

In the operational phase, the new container terminal would be paved and equipped with the rainwater collection system accounting for the site's characteristics and requirements. This system would be equipped with hydrodynamic separators to avoid the discharge of oils and sediments into the river water (Englobe, 2020a). This water management equipment would be inspected periodically to ensure its good working order, efficiency and sealing (Englobe, 2020l). Finally, concerning long-term maintenance of the runoff water management equipment during the operational phase, the new installations would be added to the Proponent's environmental management plan and thus would be inspected, cleaned or replaced so that runoff water management remains optimum. The monitoring of swimming water quality in the recreational beach area is also planned by the Proponent in conjunction with Québec City (Englobe, 2020m).

Contrary to the Proponent's assumption, Environment and Climate Change Canada considers that there is a risk that contaminants other than suspended solids and petroleum hydrocarbons may be found in runoff from the new wharf during the operational phase. Industrial activities would take place there, such as road and rail transportation, storage and movement of containers using gantry cranes or other heavy equipment, as well as the refuelling of ships with fuel and fuel oil. Some containers could contain dangerous goods that could spill as a result of a malfunction or accident. In addition, Wharf 54 would be an extension of existing port areas where solid and liquid bulk storage takes place, and it is likely that contaminated runoff from the existing areas could find its way into the storm water system of the new wharf. Environment and Climate Change Canada therefore recommends that surface water quality monitoring be conducted at the outfalls of

the stormwater system once the operational phase has begun. At minimum, petroleum hydrocarbons (C10 to C50), metals and metalloids, polycyclic aromatic hydrocarbons (PAHs) as well as parameters representative of winter icebreaking activities should be the parameters monitored and integrated into the Proponent's annual monitoring program. Furthermore, Transport Canada recommends that the wharf and the container handling area be built with a slope that is not oriented towards the river in order to prevent contaminant spills into the river water.

Changes to the Subaquatic Noise Environment and the Nocturnal Light Environment

During the construction phase, the Proponent anticipates an increase in the ambient subaquatic noise level due to the construction activities, including piledriving and dredging. According to the Proponent, piledriving can trigger very high amplitude noises and generate pressure that can cause injuries to or physiological effects on fish. However, because the fish will not stay near the work site, the Proponent considers that the work is unlikely to result in effects on or injuries to aquatic fauna. Behaviour changes would be observed, such as avoidance of the work areas (Englobe, 2020n). Regarding the noise generated by the dredging activities, the Proponent foresees minor effects (behaviour changes) on aquatic fauna during the construction phase (Englobe, 2018c).

During the operational phase, the growth of marine traffic and port activities could translate into a rise in ambient noise proportional to the increase in the number of ships circulating in the port's waters. The noise and turbulence related to ship manoeuvres are likely to disturb the fish, particularly juvenile Atlantic sturgeons and juvenile and adult lake sturgeons, which use the estuary of the St. Charles River. The striped bass spawners would suffer similar disturbances. Finally, the Proponent plans to perform maintenance dredging outside the periods of use of the area by the species at risk, which would limit the potential effects of noise generated by this activity on these fish (Englobe, 2018c).

The anthropogenic changes to the nocturnal light environment may have effects on fish, including American shad, striped bass and walleye, particularly on migration of species, changes to feeding and breeding behaviours, and competitive and predatory interactions (Englobe, 2020h). In the construction phase, the increase in nocturnal light intensity would be due, in particular, to dredging activities, construction and placement of concrete caissons. The Proponent expects that the young walleye stages will be more affected because they are attracted by light (Englobe, 2020h).

In the operational phase, the Proponent foresees that the deployment of a lighting system along the new Wharf 54 and in the warehousing area would trigger a change in the nocturnal aquatic light environment at the edge of the facilities. These changes could modify the behaviour of the aquatic organisms that frequent the illuminated area. The turbidity of the water would have the effect of reducing the penetration depth of light in the water. The Proponent proposes to deploy measures to reduce the effects of lighting on fish (Englobe, 2020h and Englobe, 2020r).

5.4.3 Agency Analysis and Conclusions on Residual Effects

Analysis of the Effects

The Agency relies on the advice of Fisheries and Oceans Canada to conclude that adverse effects and uncertainties would persist regarding the valued component, fish and fish habitat. The Project would cause significant habitat losses and adversely affect several species, including the striped bass, the lake sturgeon, the Atlantic sturgeon and the American shad. In particular, Fisheries and Oceans Canada considers that the fish habitat losses that would be caused by the Project have not been avoided, mitigated and offset sufficiently and that the Project would cause adverse effects on fish and fish habitat.

According to Fisheries and Oceans Canada, the loss of habitats and the impossibility of replacing them completely could have significant consequences on several species and would imply high risks for them. This is the case for striped bass breeding areas, certain feeding and movement areas for both adult and juvenile sturgeons species, as well as an important area for American shad during their breeding phase. Fisheries and Oceans Canada considers that the offset program proposed by the QPA would not adequately offset many of the lost habitats under the *Fisheries Act*.

For the striped bass more precisely, Fisheries and Oceans Canada is of the opinion that no avoidance or mitigation measure can significantly reduce the adverse effects of the Project on striped bass. Although the Proponent proposes relevant offset measures to counterbalance the habitat loss for young striped bass, these could not offset all the habitat losses of this species. Moreover, based on the current scientific knowledge, offsetting the lost breeding habitats would not be possible, given the nature and complexity of the characteristics attracting striped bass.

The Agency relies on the advice of Fisheries and Oceans Canada to conclude that the Project would involve current changes that would be observed in varied habitats used by a multitude of fish species. These changes would be significant in certain areas and for certain tidal phases and would affect cumulatively several dozen hectares. According to Fisheries and Oceans Canada, it is difficult to assess the precise impact of these changes on the quality of the habitats affected. These hydraulic changes would add uncertainties and risks that could contribute to the destruction of the area most intensely used for striped bass breeding. The presence of the infrastructure and their impact on the dynamics of the currents could irreversibly invalidate the present habitat functions.

The Agency finds that the Project would involve loss of feeding and movement habitat for the Atlantic and lake sturgeon species. These losses and the hydrosedimentary changes would add to the threats facing these already fragile sturgeon populations. Given the criteria met by the Beauport site habitats that would be affected by the Project (preferred habitat, concentrated presence of juveniles during feeding and major dredging), the Agency relies on the advice of Fisheries and Oceans Canada and concludes that there is a great risk that the Project will exert pressure on the two species of sturgeon.

The Project would also destroy quality rearing habitats for the American shad and an important area related to the breeding process for this species. These sites are rare and these losses would be added to all of the threats already exerted on this fragile population.

Concerning the changes to ambient noise and the nocturnal light environment during construction and operational phases, the Agency relies on the advice of Environment and Climate Change Canada to determine that the rigorous implementation of mitigation, monitoring and follow-up measures (Englobe, 2020r) during the different phases of the Project would allow reduction of the effects on the aquatic environment related to management of soil, sediments, runoff water and dredging activities. However, Fisheries and Oceans Canada points out that it was not able to specify all of the measures required to reduce the effects of the Project on fish and fish habitat because certain elements were not sufficiently advanced, including work methods and their overlap with sensitive period. If applicable, these elements would be evaluated as part of the authorization under the *Fisheries Act.*

Concerning the changes to nocturnal ambient noise and luminosity during construction and operation, the Agency considers that the measures proposed by the Proponent would be sufficient to reduce the adverse effects on fish and fish habitat.

Analysis of Harmful Effects on Species at Risk

The Agency finds that the Project, as proposed, risks affecting two aquatic species listed in Schedule 1 of the *Species at Risk Act* with “species at risk” status, namely the striped bass and the hickorynut.

The Project would destroy an important breeding habitat of the striped bass St. Lawrence River population. The Project’s harmful effects could not be lessened, avoided or controlled by measures compatible with the species recovery plan. Fisheries and Oceans Canada is of the view that, according to the current scientific knowledge, the destruction or alteration of striped bass breeding habitat identified at Beauport would risk hindering the recovery of the striped bass St. Lawrence River population and the objectives of the recovery strategy, due to the importance and rarity of the breeding sites currently identified. The species recovery strategy identifies the development of port infrastructure, including dredging, as the principal threat to the striped bass St. Lawrence River population. Considering the permanent nature of the infrastructure, their magnitude and the impossibility of making corrections after the fact, the risk generated by this type of development is high, especially when it involves high value habitat of limited size that cannot be recreated. Thus, the Agency concludes that carrying out the Project as proposed represents a high risk for the striped bass St. Lawrence River population and would not be compatible with its survival or reestablishment. Moreover, Fisheries and Oceans Canada considers that carrying out the Project, in its current form, could not be authorized under the *Species at Risk Act*. In his response statement[33] released in December 2020, the Minister of Environment and Climate Change accepted the COSEWIC's recommendation to change the status of the historic St. Lawrence River population of striped bass to “extinct”. However, the Minister is maintaining endangered species protections for existing striped bass in the St. Lawrence River until

[33] https://wildlife-species.canada.ca/species-risk-registry/virtual_sara/files/statements/rs_833_1075_2020-9_f.pdf

COSEWIC provides more information on the status of this population, which was stocked in the St. Lawrence River beginning in 2002 and has since established a self-sustaining population. COSEWIC plans to reassess the status of all striped bass populations in Canada in 2022.

Concerning the hickorynut, the Agency relies on the advice of Fisheries and Oceans Canada to conclude that conducting an inventory before the work and, as applicable, relocation of the individuals detected, would lessen the risk of mortality resulting from the Project.

Agency's Conclusion

Further to analysis and based on the assessment criteria presented in Appendix A, the Agency concludes that the Project is likely to lead to significant adverse environmental effects on fish and fish habitat, including aquatic invertebrates and special status species (Appendix B), despite accounting for the key mitigation measures detailed below. The Project would result in destruction and permanent alteration of important habitats for several species, whose survival already faces several threats. This destruction would limit or reduce the ability of fish to use these habitats. The loss of striped bass breeding areas, some feeding and movement areas for both adult and juvenile sturgeons (Atlantic and lake), and important areas for American shad during their breeding phase would not be offsetable or would be difficult to offset. Finally, the destruction of the striped bass breeding habitat would hinder the reestablishment of the species. The Agency concludes that the significance of the effects would be high for the following reasons:

- The magnitude of the Project would hinder the maintenance of the population of several fish species and no measure (avoidance, mitigation or offset) could be deployed to significantly reduce the effects on the special status species;
- The Project would result in long-term regional effects because several of the fish species that would be affected by the Project are part of migratory populations, with a regional geographic distribution, and travel long distances. The effects thus would extend beyond the local study area. The effects would be felt over a long-term, because several habitats would be lost permanently;
- Alteration of rare, complex, valuable habitats would be continuous during the operational phase and habitat alteration and destruction would be irreversible over time.

Determination of Key Mitigation Measures

The Agency has identified the key mitigation measures that could mitigate several potential effects of the Project. However, all of these measures combined could not mitigate the Project's potential effects, in its current form, sufficiently to render the residual effects insignificant. To identify the key mitigation measures, the Agency considered the mitigation measures proposed by the Proponent, the advice of the government authorities, and comments received from First Nations consulted and the public.

These fish-specific mitigation measures are not a substitute for any other legislative or legal requirements applicable to fish and fish habitat, including those under the *Fisheries Act* and the *Species at Risk Act*. They also do not guarantee that an authorization or permit would be issued under these other acts or regulations. In the event that the Proponent receives a favourable decision under CEAA 2012, the Proponent would be

required to, among other things, develop an offset plan to meet the requirements of the *Species at Risk Act* and the *Fisheries Act* to offset impacts to affected aquatic species and their habitats, in consultation with Fisheries and Oceans Canada.

During the drafting of the final Environmental Assessment Report, the Proponent continued to optimize the methods that would be used during the construction phase, in consultation with Fisheries and Oceans Canada (Québec Port Authority, 2020b). This department believes that the work methods and mitigation measures proposed by the Proponent have been improved compared to the initial planning and would make it possible to reduce certain risks of temporary effects (e.g., sedimentary impact and disturbance of fish in sensitive periods) that could occur during construction. Despite these improvements, Fisheries and Oceans Canada considers that the Project's issues related to permanent effects on fish habitat remain unresolved. The Agency considers that the improvements proposed by the Proponent are taken into account in the key measures listed below.

Specific Measures for Fish

- Carry out interventions in water outside sensitive periods for fish, particularly striped bass, Atlantic sturgeon, lake sturgeon, American shad, and American smelt. Determine these sensitive periods in consultation with the competent authorities and limit the duration of the work in the aquatic environment to the minimum;
- Carefully recover all the captive fish in the confined or isolated sections of the work site and return them immediately to the aquatic environment, in a sector favouring their survival, to avoid any fish mortality;
- During placement of piles:
  - Recover the drilling mud and deposit in a terrestrial environment;
  - Use vibration instead of hammering, unless this is not technically feasible. Start the piledriving work to allow the fish to leave the immediate area of the work. Gradual startup should begin with minimum machine power, gradually increasing to optimum power;
  - If a shutdown longer than 20 minutes is anticipated between two piledriving periods, repeat the gradual startup procedure;
- Gather and relocate the freshwater mussels with special status before construction of the containment dike while avoiding the release of exotic species. In consultation with the competent authorities and before the work, determine the areas where this collection is necessary, identify the host site favourable to the species, and determine the gathering and relocation methods;
- In consultation with Fisheries and Oceans Canada, determine the areas where hickorynuts are likely to be found. Develop and conduct an inventory to detect their presence and, as applicable, relocate the individuals in an adequate habitat for the species.
- Inspect any equipment required for in-water construction, including dredges and other watercraft, before the equipment is used in the work area to ensure that it is free of aquatic alien invasive species. The Proponent shall document the results of any inspections conducted.

Measures Specific to Work in the Aquatic Environment and Sediment Management

- Use biodegradable hydraulic oils for machinery used for backfilling the pier, with the exception of trucks, which could use conventional hydraulic oils;
- Characterize, pre-construction, sediments in the area or Pier 53 to determine the presence or absence of butyltins:
  - Determine, in consultation with Environment and Climate Change Canada and the Ministère de l'Environnement et de la Lutte contre les changements climatiques, the location, the number and depth of samples;
  - If the presence of butyltins is confirmed, in consultation with Environment and Climate Change Canada and the Ministère de l'Environnement et de la Lutte contre les changements climatiques :
    - Determine the area and depth of butyltin contaminated sediments;
    - Determine and implement dredging and management methods to ensure that butyltin contaminated sediments are properly managed.
- Maintain recognized and effective devices during in-water construction to girdle work areas so as not to exceed the suspended solids management criteria set forth in the *Recommendations for the Management of Suspended Solids (SS) During Dredging Activities* (MELCC and ECCC 2016), to prevent suspended sediments from adversely affecting Beauport Bay;
- Prior to the commencement of the dredging required for the construction of the Project, develop and implement measures to reduce emissions of contaminants and suspended solids to the environment, including:
  - During the transport and deposition of sediments;
  - For the management of dredged material and dewatering water.
- Mechanically dredge contaminated sediments using the dredging cone method or any other equivalent method that targets the contaminated sediments that need to be dredged.
  - Dredge an additional 30 centimetres around the area of contaminated sediment and manage it as contaminated sediment;
  - Use an impervious bucket when dredging contaminated sediment;
  - Minimize the distance between the dredge bucket and the barge to the lowest technically feasible distance when filling the barge;
  - Once the dredging of the contaminated sediments is completed, carry out an additional dredging passage (clean-up passage) to recover contaminated sediments that may have settled on the bottom;
  - Complete a visual inspection of the particle size and colour of the dredged material from the dredging to verify that all contaminated sediments have been dredged;
  - Install a transshipment flap at Pier 49 to prevent mechanical dredged material from being resuspended during transshipment.
- Delineate, before dredging begins, the areas in which dredging will be undertaken. The Proponent shall not undertake any dredging outside these areas;

- Construct a watertight basin at the location of the sediment transfer between the barge and the transport trucks (parcel 4), over which it transfers any mechanically dredged sediment in order to recover the dredged material and water before it reaches the aquatic environment;
- Identify and implement, in consultation with Environment and Climate Change Canada, mitigation measures to limit the risk of concrete or contaminant spills into the aquatic environment during the fabrication of concrete caissons on the submersible barge;
- Install and use, if needed, a mobile treatment unit to treat the effluent from the contaminated sediment settling pond prior to discharge into the municipal sewer in order to comply with municipal regulatory obligations related to the quantity and quality of water discharged into the sewer systems and waterways on the territory of the agglomeration of Québec City;
- Develop, before the start of the first required maintenance dredging, a protocol for the characterization and management of sediments that will be dredged during maintenance dredging. In developing the protocol, the Proponent must:
  - Identify how the Proponent will carry out in situ characterization of the sediments to determine their contamination levels;
  - Determine the methods for the management and disposal of sediment, dredged material and dewatering water that the Proponent will be able to implement during dredging based on the results of the characterization;
  - Carry out, before the beginning of each maintenance dredging period, a characterization of the sediments to be dredged. The Proponent shall identify and implement methods for the management and disposal of sediment, dredged material and dewatering water, taking into account the results of the characterization, to mitigate environmental effects on the aquatic environment.

Measures Specific to Surface Water Management

- Apply erosion and sedimentation control measures during all phases of the Project in the Project work area to limit the input of contaminated and uncontaminated suspended solids to the aquatic environment during any activity associated with the Project, including excavation and management of contaminated soil. The Proponent shall:
  - Consider periods of flooding, heavy precipitation and frost when developing these measures;
  - Periodically maintain any measures implemented and repair any damaged measures in a timely manner.
- Capture runoff from the Project during all phases of the Project and treat runoff that does not meet the prevention provisions of the *Fisheries Act* before releasing it into the environment during all phases of the Project;
- Recover water from the basin on parcel 4 by pumping (tanker) and transferring it to the dewatering basin on parcel 3;
- Promote the percolation of resurgent water into the soil during the excavation of contaminated soils;
- Clean equipment and vehicles that are likely to carry contaminated soil or sediment, in a designated washing area where water is collected and treated;

- For the operation of the concrete manufacturing plant:
  - Refer to the most recent version of the *Guide des bonnes pratiques environnementales des usines BPE* (Association béton de Québec) to determine and implement the best environmental practices;
  - Capture runoff from the concrete batch plant site and direct it to the Proponent's storm water system and install sediment traps in all catch basins;
  - Set up a watertight basin to recover the washing water from the production equipment of concrete structures for recycling in the process water;
  - Transfer the excess washing water to a water treatment basin by tanker truck;
  - Empty the sludge by dump truck and manage it off-site by a specialized firm.
- During the construction phase, clean the traffic lanes, particularly on the route used by dump trucks transporting contaminated dredged sediments to the dewatering basin (continuous use of a mechanical broom). Install sediment traps in all catch basins located along this route;
- Collect snow and dispose of it in an authorized location during all phases of the Project;
- Install systems capable of recovering suspended solids and surface oils in each of the sumps on the new dock.

Specific Measures for Soil and Groundwater Management

- Take into account the *Canadian Soil Quality Guidelines* of the Canadian Council of Ministers of the Environment and the generic criteria in Appendix 2 of the Intervention Guide – Soil Protection and Rehabilitation of Contaminated Sites of the Ministère de l'Environnement et de la Lutte contre les Changements climatiques du Québec before reusing any soil excavated during the Project. The Proponent must:
  - Consider local ambient concentrations in the receiving environment so as not to increase contaminant concentrations in the receiving environment during any reuse of soils by the Proponent even if the quality of these soils is below the thresholds set out in the *Canadian Soil Quality Guidelines* by the Canadian Council of Ministers of the Environment;
  - No soils with contaminant concentrations above background levels within 10 metres of the high-water mark (measured on a two-year recurrence basis prior to Project implementation);
  - Within the framework of the Project, do not reuse any excavated soil that exceeds the *Canadian Soil Quality Guidelines* by the Canadian Council of Ministers of the Environment for industrial soils and the "C" criteria for industrial soils set out in Appendix 2 of the *Guide d'intervention – Protection des sols et rehabilitation des terrains contaminés* of the Ministère de l'Environnement et de la Lutte contre les changements climatiques and dispose of these soils in a site authorized for that purpose;
  - Do not reuse any excavated soil to backfill the back dock area and any other area within 10 metres of the high-water mark (measured on a 2 year recurrence basis prior to Project implementation).
- Backfill the area of the back wharf or other areas near the high-water mark (recurrence of 2 years of pre-project) only with:

  - Dredged sediments that do not present, for any contaminant, any concentration higher than the occasional effect concentration established in the *Critères pour l'évaluation de la qualité des sediments au Québec et cadres d'application : prevention, dragage, restauration* (2008) of Environment and Climate Change Canada and of the Ministère de l'Environnement et de la Lutte contre les changements climatiques;
  - Land materials coming from outside the work area that meet the "A" criteria for industrial soils established in Appendix 2 of the *Guide d'intervention – Protection des sols et réhabilitation des terrains contaminés* of the Ministère de l'Environnement et de la Lutte contre les changements climatiques.
- Do not use on the QPA's property any soil excavated as part of the upgrading work on the used snow disposal site carried out by Québec City, even if this soil meets the criteria established by the QPA for reusing soil excavated as part of the Laurentia Project;
- Continuously backfill exposed soils or cover them with waterproof tarps as soon as the work is completed (daily) to limit the possibility of wind erosion or rain leaching;
- Design contaminated sediment dewatering and recovery ponds to ensure sufficient capacity for the storage of contaminated sediment during the work, as well as to ensure the watertightness and stability of the structures;
- Provide a watertight dumpster for trucks used to transport contaminated sediment to Parcel 3;
- Cover the surface of the back wharf with asphalt or concrete and install a storm sewer system on the back wharf.

Specific Measures During Temporary Work Site Closure

- Stabilize and temporarily protect the disturbed soils presenting a risk of erosion and sediment transport to the aquatic environment, using methods adapted to the site, the duration of the work site closure and the period of the year;
- Ensure that the measures deployed to limit the intake of sediments from the work site to the aquatic environment function adequately and that they are maintained before the work site closure.

Need for Follow-up and Follow-up Requirements

Under the *Canadian Environmental Assessment Act, 2012* (CEAA 2012), a follow-up program means a program verifying the accuracy of the environmental assessment of a designated Project and determining the effectiveness of any mitigation measures. The Agency is of the view that no follow-up program would allow a sufficient reduction of the uncertainties related to the Project regarding fish and fish habitat to ensure that the Project would not have a significant effect. However, for the effects that could be mitigated, the Agency recommends the follow-up program below, which would make it possible to judge the effectiveness of the mitigation measures.

- Identify, as part of the development of each monitoring program, the fish species that are being monitored for each monitoring program. The Proponent shall update each follow-up program if any species monitored and identified by the Committee on the Status of Endangered Wildlife in Canada and

listed under the *Species at Risk Act* change status during the implementation of each follow-up program.
Monitoring of suspended solids in the aquatic environment:

- Consult and implement the *Recommendations for the Management of Suspended Solids (SS) during Dredging Activities* (MDDELCC and ECCC, 2016) and develop, prior to construction and in consultation with Environment and Climate Change Canada and the Ministère de l'Environnement et de la Lutte contre les changements climatiques, a plan to monitor suspended solids generated by the Project. As part of the implementation of this follow-up:
  - Establish baseline conditions for the work area in terms of turbidity and ambient levels of suspended solids prior to the start of dredging and backfilling of the backshore area that take into account the influence of tides;
  - Calibrate the turbidity-suspended-matter curve established by the Proponent on-site, when dredging and backfilling of the backshore begins, to ensure that it is representative of conditions in the work area at the time of the work;
  - Monitor, during dredging and backfilling of the backshore, maximum variations in suspended solids concentrations using turbidimeters positioned according to the progress of the dredging and backfilling work;
  - Position the turbidimeters according to the progress of dredging and backfilling of the backshore in order to capture the maximum variations in suspended solids (SS) concentrations;
  - Turbidimeters should be placed to capture the suspended solids dispersion plume at all times and to account for the reversal of current on a rising tide;
  - Monitor, in real time using two or more additional continuously connected turbidimeter(s), the ambient levels for suspended solids outside the Project area of influence.
- If the suspended solids requirement in the receiving environment is exceeded, implement additional measures to reduce negative effects;

- Monitoring during hydraulic dredging to ensure continuous monitoring of sediments that are pumped into the settling basin to prevent dredging of contaminated sediments;
  - Gradually characterize the sediments that would be hydraulically dredged using a bucket, between 24 and 48 hours prior to dredging, for each parcel or surface unit to be dredged in order to validate that these are non-contaminated sediments.
  - Continuously monitor sediments pumped into the settling basin during hydraulic dredging for signs of contamination. If such contamination is discovered and in consultation with the relevant authorities, determine and implement solutions including complete removal by additional dredging or dredging and capping of the residual contaminated area.
- Follow-up in relation to the exposure of sediments on the seabed following the mechanical dredging required for construction:
  - Monitor the quality of sediment exposed on the seabed following dredging;
  - Develop and implement modified or additional mitigation measures if monitoring results demonstrate that exposed sediments have a concentration for any contaminant above the casual effects concentration established in the *Critères pour l'évaluation de la qualité des sediments au Québec*

et cadres d'application : prevention, dragage, restauration (2008) of Environment and Climate Change Canada and of the Ministère de l'Environnement et de la Lutte contre les changements climatiques. Among these measures, the Proponent can dredge the contaminated sediments or cover the residual contaminated area.

- Monitoring of effluent from the uncontaminated sediment settling pond:
  - Perform daily monitoring of suspended solids concentrations at the settling pond weir of uncontaminated sediments;
  - Develops and implements mitigation measures in the event that alert thresholds are exceeded.
- Monitoring of contaminated sediment dewatering pond:
  - Monitor water quality by sampling and characterizing the dewatering pond water, including water quality parameters related to the minimum requirements for discharge to Québec City sanitary sewer;
  - Conduct sampling on a daily basis, unless monitoring demonstrates that water quality meets the minimum requirements over a period of at least two weeks, in which case the Proponent shall conduct sampling on a weekly basis;
  - Develop and implement mitigation measures if monitoring results show any exceedance of the minimum requirements for discharge to Québec City's sanitary sewer.
- Monitoring runoff water during the construction and operational phases:
  - Monitoring, during the construction phase, the concentration of suspended solids and petroleum hydrocarbons (C10 to C50) in the storm system outlet of Parcel 4;
  - Monitor, during the construction phase, the concentrations of suspended solids, petroleum hydrocarbons (C10 to C50) and pH at the end of the stormwater system in the block where the concrete plant will be located;
  - Monitor, during the operational phase, concentrations of suspended solids, petroleum hydrocarbons (C10 to C50), metals and metalloids, polycyclic aromatic hydrocarbons and parameters representative of winter de-icing activities at the outfalls of the stormwater network in the St. Lawrence River;
  - Update, prior to operation, the monitoring program to reflect the final design of the outfalls associated with the Project;
  - Develop and implement modified or additional mitigation measures if monitoring or follow-up results show exceedances of the established criteria.
- Groundwater quality monitoring:
  - During the construction and operational phases, develop and implement a groundwater quality monitoring program using the six observation wells installed upstream hydraulically from the new facilities and additional observation wells in the newly developed areas. The following parameters will be monitored at least twice a year: petroleum products (HP (C10-C50), F1-BTEX, F2-F4, PAHs and VOCs), pH, sulfide, phenolic compounds, available cyanides, PCBs, ammonia nitrogen, chlorides, total fluoride, phthalates, metals and metalloids. Integrate the results into the Proponent's annual monitoring program;

- Develop and implement modified or additional mitigation measures if monitoring results show exceedances of established criteria.

- The Proponent shall submit to the Agency, the competent authorities and the First Nations, at the end of construction, a report on the management carried out by the Proponent during construction of contaminated and non-contaminated soils and dredged sediments. The Proponent shall submit the following information:
  - A balance sheet of contaminated soils disposed of off-site (including volume, source, location of disposal, environmental quality and carrier used);
  - A balance sheet of soils moved and reused in the work area (particularly in terms of volume and environmental quality);
  - An assessment of the sediments dredged and managed in the construction site area (in particular in terms of volume and environmental quality);
  - A map(s) of the work area showing the location of soils and sediments.

5.5 Birds and Bird Habitat, Including Special Status Species

The Agency is of the opinion that the Project is not likely to cause significant residual adverse environmental effects on birds and bird habitat and on birds with special status, taking into account the application of the recommended mitigation, offset, monitoring and follow-up measures. Habitat loss, noise and traffic disturbance, and unintentional mortality from collisions with overhead structures are potential effects of the Project on birds. In particular, the Project could have adverse effects on shorebirds during the spring and fall migration periods because resting habitat would be lost. However, an offset program could reduce the adverse effects of these losses. With regard to the bank swallow, the installation of artificial nesting boxes would allow the species to continue to nest in the area, provided that the sustainability of the nesting boxes is ensured.

The following subsections present the information the Agency considered in its analysis in order to reach conclusions on the significance of the effects of the Project on birds, including special status, and their habitats, as well as the advices and comments of provincial and federal government departments, First Nations consulted and the public.

5.5.1 Description of the Component "Birds, Including Special Status Species, and Their Habitats"

The analysis of the effects on birds and bird habitat component takes into consideration both migratory[34] and non-migratory[35] birds and bird habitat. The Agency considered the birds listed on Schedule 1 of the *Species at Risk Act* and for which the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) recommends a status. Species designated or likely to be designated under Quebec's *Act respecting threatened and vulnerable species* were also considered.

The area selected by the Proponent to assess the effects of the Project on birds and bird habitat is designated as the study area (SA) as shown in Figure 3, Chapter 1. However, the Proponent described only the habitats present in the work area (Englobe, 2020x). Due to its urban and industrial character, only 3% of the work site area has natural terrestrial environments. These habitats consist of grasslands, shrubbery, man-made wastelands, urban parks, maintained grounds and a beach (Englobe, 2018c). Environment and Climate Change Canada confirms that no critical habitat designated under the *Species at Risk Act* is present in the study area.

With respect to wetlands, a detailed description is provided in Section 5.3 (Wetlands). These wetlands are important habitats for birds and are part of both an Important Bird Area and a Waterfowl Concentration Area. Environment and Climate Change Canada notes that the banks of the St. Lawrence River and the southwest embayment to the Beauport sector are important spring and fall staging areas for many species of waterfowl. In addition, the Groupe d'éducation et d'écosurveillance de l'eau (G3E), guardian of the Battures de Beauport important bird area (IBA), emphasizes that the IBA is important for bird conservation and hosts large concentrations of waterfowl and shorebirds every year.

The use of the work area by birds, including special-status species, during the wintering, nesting and spring and fall migration periods was described by the Proponent based on existing documentation and inventories conducted in 2015, 2016 and 2018 (Englobe, 2020x).

During the summer period, 46 species were identified in the inventories and the Proponent estimated the number of breeding pairs to be 135 in the work area. The spotted sandpiper and the killdeer are the only shorebirds believed to breed in the area. According to the Proponent, the southwestern embayment with its intertidal marsh would have favourable habitat for waterfowl chick rearing. Mallards have been confirmed as breeders, while northern shoveler, gadwall and the Red head are possible breeders. Among landbirds, 16 bird species are classified as probable or possible breeders. These are mostly passerines which prefer open habitat, edge habitat or disturbed wasteland environments (Englobe, 2018c).

[34] Migratory Birds: birds protected by the *Migratory Birds Convention Act, 1994* and listed in the schedule to that Act.
[35] Non-migratory birds: birds that are not protected under the *Migratory Birds Convention Act, 1994*.

The work area would be used by other avian species for feeding or resting. Some of these species would be late migrants, such as the semipalmated sandpiper and semipalmated plover, while others would nest elsewhere but use the work site area for feeding purposes, such as the chipping, northern cardinal and northern woodpecker (Englobe, 2018c).

According to Environment and Climate Change Canada, in the 1970s and 1980s, the Baie de Beauport area was frequented from mid-July to the end of October by several thousand shorebirds. However, the abundance of the species in this family of birds has declined by about 40% in recent years (NABCI, 2019) and the site is used much less now. The presence of five shorebird species during spring migration and ten species during fall migration has been confirmed by the Proponent. The most numerous species are the semipalmated plover, tiny sandpiper, semipalmated sandpiper and spotted sandpiper. Most of the shorebirds that were observed in the downstream portion of the southwest inlet on the rocky beach, where they went resting or feeding.

With regard to the habitats of the southwest embayment, they are used mainly by waterfowl and other aquatic birds. In the spring, snow geese are by far the most abundant species, while in the fall, the main species observed are the mallard, black duck, blue-winged teal and green-winged teal. During the spring migration, 24 species of passerines were observed in the terrestrial environments along with northern flickers, rock pigeons, mourning doves and turkey vultures. Finally, some species, such as the black-capped chickadee, blue jay and American crow, are considered resident species; they use the habitats in the work area year-round (Englobe, 2018c).

Special Status Species

With respect to birds with special status, the Proponent carried out an analysis of the potential for their occurrence in the work area (Englobe, 2018c). Three species have a high potential for occurrence and 12 have a medium potential (Table 13).

The presence of the common nighthawk during the nesting period was confirmed in 2015 during an inventory conducted for the Project, but not during later inventories in 2016 and 2019. This species breeds in a wide range of open habitats and lays its eggs on bare ground. The open habitats present in the work area meet the species nesting requirements (Englobe 2020x).

A colony of bank swallows nests each year in the steep slopes of the beach and the southwest embayment of the Port of Québec. The Proponent built a nesting box for bank swallows in 2015 very close to the nesting site. This artificial nesting box plays an important role in the success of this colony. Since this nesting box was located in the planned work area, a new nesting box was built in 2018 to offset the destruction of the natural nesting site and the nesting box built in 2015 which had to be relocated. Monitoring of this new nesting box (2018) has shown that it is used intensively by swallows. In 2019, the 2015 nesting box infrastructure was moved to a location near the 2018 nesting box (Englobe, 2020x).

Table 13: Special status bird species potentially present on the Project site

Species	Potential or presence evaluated by the Proponent	Confirmed presence in the construction zone	Status		
			SARA[1] (Schedule 1)	COSEWIC [2]	Provincial [3]
Common nighthawk	High	Breeder observed in 2015, but not in 2016 and 2019	Threatened	Special Concern	LDTV [4]
Bank swallow	High	Yes, colony present on the site	Threatened	Threatened	No status
Barn swallow	High: Due to the presence of buildings and wetlands. Occurences in the Beauport sector	No	Threatened	Threatened	No status
Hudsonian godwit	Medium: Only on the shores of the St. Lawrence River during migration. Records exist from Pointe de Maizerets.	No	No status	Threatened	No status
Whip-poor-will	Medium: Some habitats in the construction area could be favourable for this species. Records exist from Boisé Chevalier, a woodland in Beauport.	No	Threatened	Threatened	LDTV
Peregrine falcon	Medium: Reported presence within the port area. Bunge grain silo conducive for nesting. Records exist from near the construction area.	No	Special concern	Not at risk	Vulnerable
Barrow's goldeneye, eastern population	Medium: No nesting potential. Could be present during migration.	No	Special concern	Special concern	Vulnerable
Short-eared owl	Medium: Observations exist from the Maizerets Domaine area.	No	Special concern	Special concern	LDTV
Chimney sweep	Medium: Southwest embayment and river banks can provide feeding habitat. Several records exist from near the work area.	No	Threatened	Threatened	LDTV
Canadian warbler	Medium: Records exist from near the work area.	No	Threatened	Threatened	LDTV
Red-necked phalarope	Medium: Could use the southwest embayment during migration period. Some records exist from Baie de Beauport.	No	Special concern	Special concern	No status
Eastern wood pewee	Medium: Some records, but the specie's preferred habitats are not present in the work area.	No	Special concern	Special concern	No status
Bald eagle	Medium: No preferred habitat in the construction area. Some records exist from near the work area.	No	No status	No status	Vulnerable
Rusty blackbird	Medium: Potential habitat on the edge of the southwest embayment. Records exist from near the work area.	No	Special concern	Special concern	LDTV
Caspian tern	Medium: Could use the work area during migration.	Yes, observed in 2015 during the migration period in the Baie de Beauport. No nesting potential.	No status	No status	Threatened

(1) *Species at Risk Act*
(2) Committee on the Status of Endangered Wildlife in Canada
(3) *Act respecting threatened or vulnerable species (Quebec)*
(4) LDTV: Likely to be designated threatened or vulnerable

5.5.2 Analysis of Potential Effects and Proposed Mitigation Measures

According to the Proponent, site preparation, the construction of the various port infrastructure, sediment dredging and management, the use of machinery and the development of land and rail transportation routes would have an impact on birds and bird habitat during the construction phase. In the operational phase, the presence of the wharf and the backshore space including the noise barrier, port operations, stormwater and wastewater management, land and marine traffic as well as maintenance dredging and sediment management could have an impact on birds and bird habitat. The effects would be due to habitat loss and disturbance, noise and traffic disturbance, and the risk of mortality in the event of collision with structures (Englobe, 2020x).

Habitat Loss and Disturbance

According to the Proponent, Project encroachment would result in a permanent loss of bird habitat of 7.5 hectares (Figure 9). Affected habitats would be shrubbery (1.4 hectares), grassland (0.4 hectares), anthropogenic and recreational areas (3.2 hectares), and the pebble-sand beach (2.5 hectares). However, the Proponent does not foresee any encroachment on or modification of wetlands (Section 5.3). An encroachment of 13.7 hectares in the aquatic environment is nonetheless planned (Englobe, 2020x).

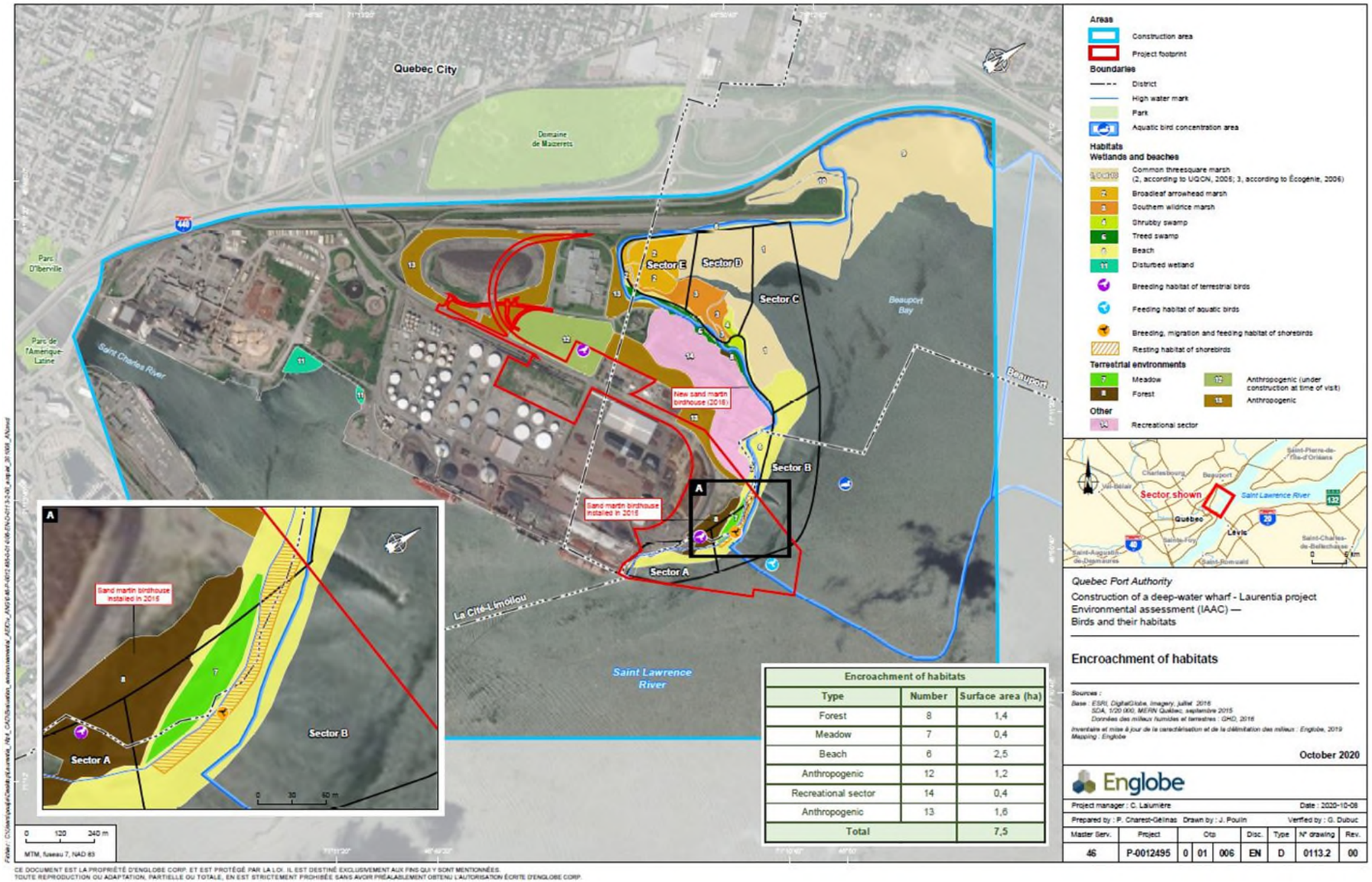
Effects of Habitat Loss or Disturbance During the Nesting Season

During the nesting period, the Proponent estimates that no more than five breeding pairs that use open habitat or transitional habitat would be affected by the loss of habitat caused by the linear infrastructure and the development of dewatering basin for contaminated sediment. On the shoreline, project-related habitat losses would affect approximately two breeding pairs of sandpipers and possibly one pair of mallards. Finally, the transformation of 1.8 hectares of human-modified environments could affect ten pairs of breeding birds, including the song sparrow and the rusty blackbird (Englobe, 2020x).

The dozen nests in the bank swallow colony on the eroded slopes of the beach would be destroyed by the encroachment of the Project. However, since the effectiveness of using an artificial nesting box to offset for the loss of natural habitat has been demonstrated since 2015, no net loss of nesting habitat is expected to occur in the Project. The Proponent has undertaken to continue its follow-up and maintenance program to ensure the sustainability of this nesting box for bank swallows. The Proponent plans to cover the piles of stored granular material with a tarp to prevent bank swallows from using them for nesting (Englobe, 2020x). Environment and Climate Change Canada is concerned about the Proponent's proposed *Trame Verte* (Englobe, 2020x) which could have adverse effects on bank swallows that use artificial nesting boxes. Planting trees near the nesting boxes could provide cover that would favour the presence of predators (falcon, hawk) and allow them to attack swallows. Environment and Climate Change Canada therefore recommends that the immediate area around the bank swallow boxes remain open and free of vegetation, to reduce the risk of predation.

With regard to the common nighthawk, following the targeted inventories in 2016 and 2019, the Proponent estimates, that the work area does not have any nesting habitat for this species. However, the Proponent's monitoring program does include monitoring for the presence of this species in order to intervene in a timely manner if an individual decides to nest in the work area (Englobe, 2020x).

Figure 9: Project encroachment onto the different types of bird habitat on the Project site and location of the swallow nesting box



Encroachment of habitats		
Type	Number	Surface area (ha)
Forest	8	1,4
Meadow	7	0,4
Beach	6	2,5
Anthropogenic	12	1,2
Recreational sector	14	0,4
Anthropogenic	13	1,6
Total		7,5

Source: Englobe, 2020x

The high potential for the presence of the barn swallow is associated with man-made structures such as docks, buildings, bridges, etc., together with wetlands in the vicinity of the work area. However, no individuals of this species were observed during the inventories. With respect to the chimney swift and the peregrine falcon, individuals were observed flying over the work area, but no nesting was observed. Consequently, the Proponent does not anticipate any effect on these three species at risk (Englobe, 2020x).

Site preparation and infrastructure construction would require free clearing and brush removal on 3.6 hectares of land. These activities would take place before mid-April to avoid the nesting period and a verification of the presence of active nests would be carried out by an ornithologist before the activities begin. Thus, if a nest is discovered, a buffer zone would be established to allow the bird to complete its nesting cycle. The work can only be carried out once an ornithologist has confirmed that the chicks have left the nest and the surrounding area.

Environment and Climate Change Canada is satisfied with the Proponent's description of the potential environmental effects. It has pointed out, however, that the loss of nesting and feeding habitat would have potential effects, particularly on breeding pairs that would have to relocate to similar habitats nearby, if available. If these habitats become scarcer, this could increase the density of birds in the same habitat and lead to a scarcity of resources and an increase in predation. The Department also points out that habitat destruction and degradation contribute directly or indirectly to the decline of some more vulnerable species. Some pairs of birds will succeed in establishing themselves elsewhere, while others will not be able to, because of their greater vulnerability to disturbance of their breeding habitat, intra- and interspecific competition or predation.

Effects of Habitat Loss or Disturbance on Migrating Birds

During the migration period, backfilling of the backshore space would result in permanent habitat losses of habitat affecting the beach (2.5 hectares) and the aquatic environment (13.7 hectares), which are habitats used by many waterbird species during spring and fall migration. One end of the waterfowl concentration area would be affected by this encroachment.

Specifically, backfilling of the backshore space would result in permanent loss of the sand-cobble beach, which provides habitat for shorebirds during spring and fall migration. The area where sandpipers concentrate to the greatest extent during high tide is small and would be limited to the industrial and recreational beach. The loss of the 2.5-hectare area of beach would reduce the resting habitat available at high tide during shorebird migration by approximately 3,346 square metres. The Proponent indicates that the resting area at high tide associated with the Baie de Beauport recreational beach would be maintained and available to shorebirds that use it as a feeding area. At the request of Environment and Climate Change Canada, the Proponent has produced an analysis to document the availability of habitats required by shorebirds within an area corresponding approximately to the administrative limits of the Port of Québec's aquatic zone. This analysis identified resting areas available within five kilometres of the Baie de Beauport feeding area. The Proponent concludes that the permanent loss of resting habitats would not result in fragmentation of the functional unit comprising the Baie de Beauport feeding area, since other habitats are available nearby along the Côte de Beaupré and around Île d'Orléans. In light of this analysis, the Proponent

is not proposing offset project. However, it has proposed a follow-up that would specifically involve assessing the use of the resting area of the recreational beach during the construction and operation of the Project (Englobe, 2020x).

Environment and Climate Change Canada is concerned about the permanent loss of spring and fall migration habitat (resting habitat) for shorebirds in relation to the loss of the sand-pebble beach. It is of the opinion that the Proponent's estimate of the area of available habitat (feeding and resting) is too high, as the proximity of woodlands and the presence of rows of trees or areas of human disturbance means that some habitat would likely not be used because of the potential for predation and disturbance. Environment and Climate Change Canada emphasizes the importance of providing resting habitat at high tide for shorebirds, as they use it until feeding habitat becomes available again with the falling tide. Feeding habitats are less likely to be used if there is no resting habitat nearby.

Environment and Climate Change Canada is of the opinion that some uncertainty persists regarding the effects of the loss of quiet areas of the industrial beach on shorebird species. Given the general decline in shorebird numbers in recent years, it recommends that the principle of no net loss be applied and that specific offset measures for shorebird resting sites at high tide be developed. The Department believes that, contrary to the Proponent's position, it is unlikely that the portion of the beach located in the recreation and tourism zone will still be available for shorebirds following construction of the wharf and the backshore space, since shorebirds are likely to avoid using this section of the beach because of the disturbance associated with recreational activities.

The Groupe d'éducation et d'écosurveillance de l'eau (G3E) considers that the effects of the Project on the birds that frequent the IBA should have been better documented by the Proponent taking into account the importance of the IBA and it avian richness. The G3E is particularly concerned about noise disturbance, loss of habitat, altered air currents, changes in night-time light, and decreased food quality and quantity. In particular, the G3E is concerned about the loss of habitat at high tide for shorebirds and points out that significant losses have already occurred, notably during the construction of the Dufferin-Montmorency highway, which filled a large portion of the shoreline.

Disturbance From Noise, Traffic and Night Lighting

Activities associated with the construction of the facilities, including transportation and traffic, would cause significant increases in noise levels at the periphery of the work area. Certain construction activities, such as the use of heavy machinery and pile driving, would generate more noise during the construction phase and could disturb the activities of certain bird species, including nesting. According to the Proponent, the noisy work could cause stress for nesting birds as well as the abandonment of nests and the displacement of nesting pairs to other areas. This could affect the reproduction of certain birds and create intraspecific competition for nesting territory if they move to less noisy sectors. The Proponent indicates that the sector in which the Project is located is already noisy and that the birds frequenting the surrounding environment have adapted to the disturbance and noise. The main species that would be affected by this effect are aquatic birds, such as gulls, waterfowl and shorebirds. Disturbance of the noise climate could disturb these

birds that frequent the area surrounding the construction site, especially near the sand-cobble beach during the periods of greatest use, i.e., the fall migration period of shorebirds (Englobe, 2020x).

During the operations phase, the main effect on birds would be disturbance from routine activities such as transhipment, storage, handling and traffic, as well as from night lighting and maintenance work. According to the Proponent, the disturbance effects would be similar to those during the construction phase, but on a smaller scale due to the limited transmission of noise. The Proponent indicated that the noise level during Project operation would not compromise the use of nearby habitats by birds during the nesting period or spring and fall migration periods (Englobe, 2020x).

According to the observations made by the Proponent during monitoring of the artificial nesting boxes for bank swallows in 2019, noise disturbance from port activities does not seem to modify the behaviour of the swallows. The Proponent also indicated that the success rates calculated for the new nesting box during the 2019 inventory suggest that the colony of bank swallows is adapted to the noise and light conditions associated with the industrial port zone that have existed in this sector for several decades (Englobe, 2020x).

Finally, the mitigation measures (Englobe, 2020r) designed to reduce noise for the human population would also benefit birds. Environment and Climate Change Canada recommends continuing the monitoring already begun, considering the recent installation of nesting boxes and their monitoring, as this would also be useful for addressing any remaining uncertainty regarding the noise disturbance effects of the Project on bank swallows.

Risk of Mortality from Collision with Structures

During the operating phase, the height of the cranes (86 metres) and the attractive effect of the lights present on such high structures are of concern to Environment and Climate Change Canada, which has asked the Proponent to further documents this issue and take it into account in its analysis. These structures could have impacts on birds that fly into them, particularly during migration periods and especially in the presence of fog. Light pollution can disorient migratory birds and this type of pollution causes thousands of fatal collisions with man-made structures each year.

According to the Proponent, nighttime deaths are often caused by collisions with structures, mostly guy wires (a bar or cable used to hold them in place), or glass surfaces, which are more difficult for birds to see. The Proponent indicated that red light, commonly used on towers and other tall structures, is believed to interfere with birds' ability of birds to follow geomagnetic cues. It would therefore be advisable to avoid the use of such lights and to install shields above the lights to prevent scattering of light skyward.

The Proponent indicated that, during container unloading activities, the four gantry cranes would be in operation approximately 53% of the time; the Proponent undertook to turn off the lighting system when the cranes are not in use. Finally, according to climate data for Jean-Lesage Airport for the period between 2009 and 2019, fog and reduced visibility conditions occurred for periods ranging from 54 to 114 hours annually, or 0.6 to 1.3% of the time. The Proponent points out that these data must be interpreted with caution, however, since fog conditions may be more frequent along the St. Lawrence River. The Proponent considers that bird mortality resulting from collisions with structures would be low due to the absence of guy wires and

large areas of reflective glass portal cranes lighting will only be on when the cranes are in operation. Finally, the Proponent undertakes to monitor bird mortality at the port site resulting from collisions with structures and to take corrective action if necessary (Englobe, 2020x).

5.5.3 Agency Analysis and Conclusions on Residual Effects

Effects Analysis

The Agency concludes that the Project is not likely to cause significant adverse effects on land or water bird species with healthy and resilient populations, provided that all key mitigation measures are implemented in a timely manner. The Agency relies on the advice of Environment and Climate Change Canada in reaching this conclusion.

However, uncertainties remain regarding the potential effects of the Project on shorebirds. Indeed, shorebirds have experienced large population declines in recent years and any loss of habitat may have consequences for them. In this regard, Environment and Climate Change Canada has pointed out the uncertainties relating to the quality and use of replacement habitats in the area adjacent to the Project and on a regional scale given their relative scarcity in the study area. The permanent nature of the losses caused by the Project adds to these uncertainties. Finally, although the Proponent refers to voluntary initiatives to which it has committed, including the Québec Metropolitan Community's *Trame Verte*, it is not currently possible to assess the extent to which these initiatives would help mitigate the Project's effects on shorebirds. For these reasons, and to ensure that the Project does not cause significant adverse environmental effects on shorebirds, the Agency is of the opinion that offset measures specific to high tide rest areas for shorebirds must be put in place.

Analysis of Harmful Effects on Species at Risk

The Agency notes that the Project, as proposed, could affect five bird species listed on Schedule 1 of the *Species at Risk Act* as “threatened”: the bank swallow, common nighthawk, barn swallow, chimney swift and peregrine falcon.

The Agency is of the opinion that the Project is unlikely to have adverse effects on barn swallows, chimney swifts and peregrine falcons since these species do not nest in the Project work area and the only observations of chimney swifts and peregrine falcons consisted of individuals flying over the Port of Québec.

In the case of the bank swallow, the installation of artificial nesting boxes allow the species to reproduce and continue to use this habitat provided that the Proponent ensures the sustainability of the nesting boxes over time by continuing to monitor and maintain them. The Agency recommends continuing to monitor the use of the nesting boxes in view of their recent installation, and to address any remaining uncertainties regarding the noise disturbance effects of the Project on this species.

The common nighthawk was not observed during the 2016 and 2019 inventories. However, bare ground areas could attract these birds during the nesting period. In keeping with the recommendation of Environment and Climate Change Canada, the Agency is of the opinion that monitoring this species during the construction and operational phases, as well as the implementation of measures in the event that nesting is observed, would ensure that the species is not harmed.

Agency's Conclusion

Following its analysis and based on the assessment criteria presented in Appendix A, the Agency concludes that the Project is not likely to cause significant adverse environmental effects on birds, including species at risk, and their habitats (Appendix B), taking into account the application of the key mitigation measures described below. Habitat loss, noise and traffic disturbance, and potential mortality from collisions with structures could be potential effects of the Project on birds. The Agency concludes that the level of significance of the effects would be moderate for the following reasons:

- The magnitude of the Project's residual effects on birds, including species at risk, and their habitats, would be low since the shorebird offset project would reduce effects during migration and the bank swallow nesting box, if it is permanent, would allow the species to continue to use the area during the nesting period. No other species would be impacted in a way that would affect an important phase of its life cycle;
- The Project would result in residual effects that would be local in scope and long term in duration, since the habitat losses would be permanent and their effects would be felt indefinitely;
- The residual effects of the Project would be irreversible and would occur continuously since the habitat losses are permanent.

Determination of Key Mitigation Measures

The Agency has identified the key mitigation measures required to ensure that the proposed Project does not cause significant residual adverse environmental effects on birds, including species at risk, and their habitats. It has taken into account the mitigation measures proposed by the Proponent (Englobe, 2020r), the advice of government authorities, as well as the comments received from First Nations consulted and the public. These measures are as follows:

General Measures

- Put measures in place to protect birds and to avoid harming, killing or disturbing migratory birds or destroying, disturbing or taking their nests and eggs. In this regard, the Proponent shall follow Environment and Climate Change Canada's *Avoidance Guidelines* in order to reduce the risk to birds. The measures that the Proponent implements as part of the Project are in compliance with the *Migratory Birds Convention Act*, *1994, the Migratory Birds Regulations* and the *Species at Risk Act*.

- Do not carry out any activity that could interfere with the bird's nesting during their breeding period:
  - Determine the dates of the breeding period of the birds potentially present for any year during which activities that may interfere with nesting are carried out. Notify the Agency of these dates prior to undertaking these activities;
- During construction and operation, maintain the nesting boxes in a condition that allows them to be used by shore martins, in particular by keeping the areas around the nesting box open (without vegetation).

Shorebird Resting Habitat Offset Project

- The Proponent shall develop, in consultation with Environment and Climate Change Canada, and shall implement offset measures for shorebird resting habitat prior to the construction phase, that respects Environment and Climate Change Canada's *Operational Framework for the Use of Conservation Allowances*. According to this document, if it is not possible to implement the offset measures before adverse effects occur, the best option is to implement offset measures during the construction phase at the same time as the activities that would result in adverse effects;
- Offset habitats will have to be maintained during the operational phase. Any material, installation, structure or development implemented to meet the requirements of the offset project must be maintained in the operational state specified in the offset plan;

Need for Follow-up and Follow-up Requirements

A follow-up program is required in order to verify the accuracy of the environmental assessment and to determine the effectiveness of the mitigation measures to avoid harm to birds, including species at risk.

The Agency considers that the follow-up program should include the following elements:

- Identify activities or operations that may have an effect on birds, including species at risk, and for each of these, determine the measures to be put in place to ensure that the nuisance or disturbance is minimized, particularly during the nesting period. The monitoring program will have to pay particular attention to bird species at risk, including the common nighthawk and the bank swallow, which are likely to use certain areas of the Project site, particularly areas where there is no vegetation;
- Update the follow-up program during construction and operation if species monitored and identified by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and listed under the *Species at Risk Act* change their status during the implementation of the Project;
- Monitor the adverse environmental effects of the Project on migratory birds, including the effects of noise generated by the Project on bank swallows (Riparia riparia) and mortality at the base of infrastructure at risk (overhead structures);
- Develop and implement monitoring to determine if noise generated by construction and operations of the new terminal is having an adverse environmental effect on the species and implement corrective measures if required.

Tracking for Shore Swallows

- Continue to monitor the bank swallow nesting boxes to ensure the continued success of their use by the species during the construction and operational phases. Monitoring must be done over a sufficiently long period of time to ensure that the colony is maintained over the long term. Monitoring should, at a minimum, be annual during the construction phase and during the three years following construction, and every five years thereafter throughout the life of the Project's operation;

Monitoring of the Shorebird Offset Project

- Develop, in consultation with Environment and Climate Change Canada, and implement a follow-up of the offset project for shorebirds to ensure its success and implement corrective measures if required;
- Monitor the integrity and use of high tide staging habitats for shorebirds annually for a minimum of five years. The Proponent shall continue annual monitoring of staging habitats until performance indicators identified in the development of the monitoring program demonstrate the success of the staging habitats. Once the performance indicators demonstrate the success of the staging habitat, the Proponent shall update the monitoring program once every five years for the duration of the operation.

5.6 Other Species with Special Status

The Project may have residual effects on special status species other than those described in Sections 5.4 (Fish and Fish Habitat) and 5.5 (Birds and Bird Habitat). The Agency is of the opinion that the Project would not cause significant residual adverse environmental effects on other special status species, taking into account the application of the mitigation and follow-up measures recommended below. The following subsections present the information considered by the Agency in its analysis, including the advices and comments of the expert departments, First Nations consulted and the public.

5.6.1 Description of the component “Other Special Status Species”

This analysis focuses on species with special status, i.e., species that benefit from legal protection under federal and provincial legislation, such as the *Species at Risk Act* and the Quebec *Act respecting threatened or vulnerable species* (QARTOVS), or for which the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) recommends a status under SARA, as well as species likely to be designated under the Quebec *Act respecting threatened or vulnerable species*.

The study area selected by the Proponent to assess the effects of the Project on special-status fauna and flora is the construction zone (Figure 3, Chapter 1). A description of the habitats in this area is summarized in Sections 5.3 (Wetlands) and 5.5 (Birds and Bird Habitat).

The Proponent has conducted an analysis of the potential presence of species with special status (Appendix 8.1 of Englobe, 2018b) in the work area (Table 14), which identified six species of vascular plants with special status (Victorin's Tiger Beetle, Parker's Eriocaulon, Ochraceous Strophostyle, Estuarine wildrice, Victorin's Gentian and Canada Lily), two terrestrial mammals (Pygmy Weasel and Grey Bat), five arthropods (Broad-spotted Trechin, Two-spotted Ladybug, Nine-spotted Ladybug, Fritillary and Monarch) and three reptiles (Green Snake, common map Turtle and Snapping Turtle) with high or medium potential. This analysis was based on the habitat criteria of each species whose range overlaps with the site area. The inventories carried out by the Proponent targeted Victorin's gentian and Victorin's hawk beetle var. *victorinii* as well as birds and turtles.

Table 14: List of special status species other than those described in Sections 5.4 and 5.5

Species: Vernacular name (Scientific name)	Potential presence assess by the Proponent	Inventories (1)	Status		
			SARA (2) (Schedule 1)	COSEWIC (3)	QARTOVS (4)
Vascular plants					
Victorin's Cicutaire (*Cicuta maculata var. victorinii*)	**High**:The construction zone includes a preferred habitat (spartan grassland) for this species in the southwest embayment.	GHD (5), 2015a No observation	Concerned	Concerned	Threatened
Eriocaulon de Parker (*Eriocaulon parkeri*)	**High**: The work area includes a preferential habitat (spartan grassland) for this species in the southwest embayment.	No specific inventory	Not at risk	Not at risk	Threatened
Ochracer Strophostyle (*Strophostyles helvola*)	**High**: The work area includes preferred habitat (freshwater estuarine environments). A mention (QNHDC (6)) in 1999 in the Baie de Beauport sector.	No specific inventory	Not rated	Not rated	LDTV (7)
Estuarine wildrice (*Zizania aquatica var. brevis*)	**High**: The QNHDC reports two mentions near the construction zone. However, the mentions are not recent.	No specific inventory	Not rated	Not rated	LDTV
Victorin Gentian (*Gentianopsis virgata subsp. Victorinii*)	**Medium**: The work area includes a preferential habitat (spartan grassland) for this species in southwest embayment.	GHD6, 2015a No observation	Threatened	Threatened	Threatened
Canada Lilies (*Lilium canadense*)	**Medium**: Species associated with moist forests. Some areas of the work area could correspond to a habitat.	No specific inventory	Not rated	Not rated	Vulnerable to harvest
Reptile					
Green Snake (*Liochlorophis vernalis*)	High: Preferred habitat present in the work area (grassy areas near wet and bushy areas). According to the QNHDC, the species is present in the Capitale-Nationale region.	No specific inventory	Not rated	Not rated	LDTV
Common map turtle (*Graptemys geographica*)	Medium: Sectors favourable for the species present in the construction zone, notably the south shore of southwest embayment. Traffic on the Baie de Beauport beach reduces the chances that the species will use it as a nesting site. Mention at the Maizerets Domain. Important physical barrier by the Dufferin Montmorency highway.	GHD (8), 2015b No observation	Concerned	Concerned	Vulnerable
Snapping turtle (*Chelydra serpentine*)	Medium: The species could use the dense herbaceous marshes of the southwest embayment. Only one mention in the Beauport tidal flats.	GHD6, 2015b No observation	Concerned	Concerned	No status
Mammals					
Pygmy weasel (*Mustela nivalis*)	Medium: Preferential habitat present near the southwest embayment. However, the strong human presence limits its potential. No occurrence reported to the QNHDC within an 8-kilometre radius.	No specific inventory	Not rated	Not rated	LDTV
Grey bat (*Lasiurus cinereus*)	Medium: Could take advantage of the isolated trees and the wooded and hunted area above the water bodies. No occurrences reported to the QNHDC within an 8-kilometre radius.	No specific inventory	Not rated	Not rated	LDTV
Insects					
Ground Beetle (*Trechus crassiscapus*)	Medium: The marshes of the southwest embayment could be favourable to the species.	No specific inventory	Not rated	Not rated	LDTV
Two-spotted ladybug (*Adalia bipunctata*)	Medium: This species has a preference for trees and shrubs rather than low plants. The construction site area includes this type of habitat.	No specific inventory	Not rated	Not rated	LDTV
Nine-spotted ladybug (*Coccinella novemnotata*)	Medium: The construction site area has preferential habitats for this species.	No specific inventory	No status	Endangered	LDTV
Mixed fritillary (*Euptoieta claudia*)	Medium: The construction site area has preferential habitats for this species.	No specific inventory	No status	No information	LDTV
Monarch (*Danaus plexippus*)	Medium: The species is associated with milkweed and could use the plants that are in the construction area.	No specific inventory	Concerned	Endangered	No status

(1) Inventories carried out for the Project
(2) Species at Risk Act
(3) Committee on the Status of Endangered Wildlife in Canada
(4) *Act respecting threatened or vulnerable species* (Quebec)
(5) GHD, 2015a. Result of the inventory to verify the presence of Victorin's gentian and Victorin's sharpshooter var. victorinii in Appendix B8 in GHD, 2016
(6) Centre de données du patrimoine écologique
(7) LDTV: Likely to be designated threatened or vulnerable
(8) GHD, 2015. Wildlife inventories – birds and turtles in Appendix B10 in GHD, 2016

The habitats that would be directly affected (habitat loss) by the Project are not conducive (disturbed habitats) to most special status species with a high or medium potential presence in the work area. However, the southwest embayment is a rich and particular environment with intertidal marshes, freshwater estuarine environments and shorelines and has several characteristics of preferred habitats for several special status species.

In terms of vascular plants, the southwest embayment could be home to special-status vascular plants such as Victorin's gentian, Parker's eriocaulon, ochraceous strophostyle, estuarine wildrice, and Canada lily (Englobe, 2018b). In 2015, the Proponent conducted inventories to determine if Victorin's sharpshooter and Victorin's gentian were present on their property in the Baie de Beauport sector (GHD and Consultants Ltd., 2015a). No specimens were observed during the surveys. Wetland and vegetation characterizations were also conducted in 2015 (GHD and Consultants Ltd. 2016a), 2016 (GHD and Consultants Ltd., 2016b) and 2019 (Englobe, 2019; Appendix A) and did not identify any plant or wildlife species with a special status.

For wildlife species, the baseline status is essentially based on existing documentation, and additional inventories were conducted to determine the presence of certain special-status species in the work area. Inventories were conducted in 2015 (GHD, 2015b. Wildlife inventories – birds and turtles in Appendix B10 in GHD, 2016a) which targeted snapping and common map turtles. The Proponent has not identified or observed any wildlife species with special status in the work area (GHD, 2020g). No specific inventory of special status species has been conducted since 2015. Environment and Climate Change Canada points out that although no incidental observations of wildlife species at risk were made during the characterizations of terrestrial and riparian habitats carried out in 2016 and 2019, it believes that it is not possible to rule out the possibility that one or more of these species may be present in the work area.

It is also important to note that during the Proponent’s characterization of the vegetation in 2019 (Englobe, 2019; Appendix A), several invasive alien species were observed, some of which could be in competition with native species, particularly species with special status. However, according to the Proponent, the majority of these invasive alien species have been identified in the anthropogenic wastelands surrounding the Québec City snow dump and the two other sectors bordering the Baie de Beauport recreational sector, an area that is heavily anthropized.

5.6.2 Analysis of Potential Effects and Proposed Mitigation Measures

No potential effects are anticipated by the Proponent on special-status wildlife and plant species during the construction or operational phases. The environments that would be completely destroyed (herbaceous and arboreal) are colonized by relatively common flora and no floral species with a special status have been identified. Moreover, these environments do not display habitat characteristics conducive to the presence of floral species with special status since they favour intertidal environments (Englobe, 2020e).

The Agency is concerned about the introduction and spread of invasive alien species that could compete with native species and degrade the quality of habitats in the southwest embayment. The Proponent has raised this threat to native vegetation as a whole, but this threat could also affect habitats suitable for special

status species. For example, vehicle and construction machinery traffic and the transportation of granular materials could contribute to the introduction and spread of invasive alien species in the work areas, and thus adversely affect the quality of habitats favourable to special status species.

With respect to wildlife species, the Proponent points out that the habitats within the Project's footprint are also not very conducive to special-status wildlife species since they are composed of environments typical of industrial zones, particularly industrial wastelands that are poorly or not at all maintained. Although the aquatic environment contains more suitable habitat (particularly for fish), riparian environments would also be unlikely to be considered important habitats for a special-status wildlife species other than avifauna (Englobe, 2020g). Thus, the Proponent mentions that should a special-status wildlife species inhabit the work area, the anticipated effects would be the same as those anticipated for terrestrial wildlife in general, i.e., the loss of 4.6 hectares of habitat and disturbance by noise (Englobe, 2018b and Englobe, 2020g).

The Proponent proposes mitigation measures to reduce the effects on terrestrial and riparian environments (Englobe, 2020e) as well as on terrestrial wildlife and its habitat (Englobe, 2020r) that also target special status species. Among other things, during the construction phase, measures include the revegetation of disturbed areas immediately after the end of the construction work to ensure rapid vegetation recovery and other noise-related measures aimed at reducing disturbance to terrestrial wildlife. The Proponent is also planning mitigation measures to reduce the risk of introducing or spreading invasive alien species in the construction area.

The Proponent did not propose a monitoring and follow-up program, considering that no special-status species (other than birds or fish) were observed on the Project site. However, not all species of special status were subject to a specific inventory. Thus, Environment and Climate Change Canada is of the opinion that it is not possible to exclude the presence of species at risk and recommends that a component on species at risk be added to the monitoring program.

5.6.3 Agency Analysis and Conclusions on Residual Effects

Effects Analysis

The construction zone is an industrialized environment where mainly marginal, disturbed and small areas of habitat are found. No special status species was observed during the field visits conducted by the Proponent. However, only four species at risk, the Victorin's shrew, Victorin's gentian, common map turtle and snapping turtle, were the subject of targeted inventories. Uncertainty therefore remains as to the presence of the other special-status species. Given the duration of the Project and the limitations of documenting the baseline, Environment and Climate Change Canada is of the opinion that it is not possible to exclude the possibility that species at risk may be present in the study area during any phase of the Project. However, it is of the opinion that avoiding work in wetlands is the best mitigation measure to reduce the risks of adverse effects on potentially present amphibian and plant species at risk and their potential habitats. The Ministère de l'Environnement et de la Lutte contre les changements climatiques considers that there are no issues related to threatened, vulnerable or designated plant species.

Analysis of Harmful Effects on Species at Risk

According to the Victorinian Gentian Recovery Strategy (Environment Canada, 2012) and the Victorinian Shrew Management Plan (Environment Canada, 2011), these two species are endemic to the province of Quebec and occupy the intertidal freshwater or slightly brackish water areas of the St. Lawrence River estuary. Several threats have been identified for these two species, including shoreline infilling, infrastructure development, trampling and invasive plants. The population and distribution objectives are first to maintain and increase the population size and, if possible, to increase the population of these two species in the long term throughout their range. Since the occurrences of these two species are known and neither has been recorded in the construction zone (CZ) work area, the Agency concludes that the Project is unlikely to have adverse effects on them.

According to the management plans for common map turtles (Environment and Climate Change Canada, 2019) and snapping turtles (Environment and Climate Change Canada, 2020), their late maturity and potential threats to their habitat make these species vulnerable to population decline. Threats include direct mortality due to motorboat collisions (common map turtle), habitat loss and degradation, and by-catch in commercial fisheries. Thus, the management objectives for these species are to maintain and, where possible, increase the spread and abundance of the population by reducing the major threats. Given that the potential habitats (southwestward return) for these species will not be affected by the Project and that no presence was detected by the Proponent during the inventories, the Agency concludes that the Project is unlikely to have adverse effects on these species.

According to the monarch butterfly's management plan (Environment and Climate Change Canada, 2016), the threats to this butterfly species are mainly related to their wintering grounds in Mexico, which are degrading or disappearing. The increased use of herbicides and associated declines in the milkweed that the butterfly's caterpillars exclusively feed on are a threat throughout its range, including Canada. In order to substantially reduce the risk of extinction, the long-term goal is to protect the monarch's migration phenomenon, which occurs in three countries (Canada, the United States and Mexico). Considering that the Project affects a small area of terrestrial environment and does not affect the wintering grounds, the Agency concludes that the Project is unlikely to have harmful effects on this species. However, the Agency encourages the Proponent to include milkweed among the native species during revegetation and thus favour the monarch in its caterpillar stage.

For the nine-point ladybug, no recovery strategy has been written to date. According to the *Species at Risk Public Registry*[36], this species has declined significantly and is now rarely seen. The precise causes of the decline are unknown. Possible threats include the introduction of non-native ladybugs and reduced habitat quality through pesticide use. Thus, based on the available information, taking into account the small area of terrestrial habitat that would be lost, and given that this species is rarely observed and the habitat does not appear to be limiting, the Agency concludes that the Project is unlikely to have adverse effects on this species.

[36] https://www.canada.ca/fr/environnement-changement-climatique/services/registre-public-especes-peril.html

Agency's Conclusion

Based on the advice of Environment and Climate Change Canada and considering that the construction work area is an industrialized environment that supports mostly marginal, disturbed and small area habitats, the Agency is of the opinion that the Project is not likely to have significant adverse effects on special status species (Appendix B). However, the habitats in the southwest embayment could support some of these species. The Proponent does not foresee any effect on the habitats in the southwestern re-entry during the construction or operational phase and does not anticipate that the presence of the new infrastructure will have an adverse influence on them (see Section 5.3). However, as described in Section 5.3, a follow-up will have to be put in place to verify the accuracy of the environmental assessment of the Project and to verify whether it has an influence on the wetlands of the southwest embayment.

Finally, the Agency considers that the measures proposed by the Proponent would reduce the risks of introduction and spread of invasive alien species.

Based on its analysis, the Agency concludes that the level of effect on special status species (other than fish or birds) would be low for the following reasons (Appendix A):

- The magnitude of the Project's effects would be low since the habitat that will be lost or disturbed by the Project is an industrialized environment that supports mostly marginal, disturbed and small area habitats. The inventories conducted by the Proponent and targeting certain special status species have not detected the presence of these species. The effects would not adversely affect the maintenance or management or recovery of one or more of these species;
- The Project would result in a long-term, one-time change to the environment, particularly on disturbed and marginal habitats;
- Adverse effects would be continuous and partially reversible over time.

Determination of Key Mitigation Measures

The Agency has identified the key mitigation measures required to ensure that there are no significant adverse environmental effects on special status species. It took into account the mitigation measures proposed by the Proponent, the advices of government authorities, as well as the comments received from First Nations consulted and the public. The key mitigation measures are as follows:

- Delineate in the field, before deforestation begins, the areas where deforestation would be necessary. Deforestation outside these areas should not occur unless required for safety reasons;
- Carry out, before the beginning of the work, a delimitation of the environments colonized by invasive alien floristic species in order to properly identify them;
- Specify in the contractors' technical specifications that the granular materials used must come from a source free of invasive alien species;
- Clean machinery that will be used in areas colonized by invasive alien species before using it elsewhere on the site. Provide washing stations in areas not conducive to seed germination and away from streams, water bodies and wetlands;

- If invasive alien species are visible in work areas, eliminate them by burying them on-site where excavation will take place, in a 2-metre-deep pit, then covering them with at least 1 metre of unaffected material, or by disposing of them in an authorized engineered landfill;
- Revegetate disturbed areas immediately after the end of the construction work to ensure a quick recovery. Follow seeding rates prescribed by the manufacturer. Use native species to the designated Project area, including but not limited to milkweed species that support habitat the monarch butterfly (Danaus plexippus).

Need for Follow-up and Follow-up Requirements

In order to verify the accuracy of the environmental assessment and to ensure that the infrastructures that would be put in place would not have a significant impact on these wetlands that may be home to a special status species, the Agency considers that a follow-up of the evolution of the wetlands is necessary during the operational phase. This monitoring is discussed in more detail in Section 5.3.

5.7 Human Health (Physical and Psychological)

The Agency considers that the Project is likely to cause significant residual adverse environmental effects on human, physical and psychological health, given that it would contribute to the degradation of air quality in a living environment where several environmental and socio-economic health risk factors are already present and known.

This section describes the Project's effects on human health (physical and psychological). The following subsections present the information that the Agency considered in its analysis to conclude on the significance of the Project's effects on health, including advices and comments of expert departments, First Nations consulted and the public.

5.7.1 Description of the Component "Human Health"

This section deals with the effects of the Project on physical and psychological human health resulting from the changes caused by the Project on the environment and, more specifically, on air quality, noise and the quality of water used for recreational purposes and drinking water.

The study area selected by the Proponent to assess the effects of the Project on human health is the expanded study area (Figure 3, Chapter 1). This zone includes the inhabited areas of Québec City (Limoilou, Maizerets, Saint-Jean-Baptiste, Beauport and Old Québec City and its tourist area), Lévis and Île d'Orléans (Saint-Pétronile) that are likely to be affected by the Project's environmental effects (Englobe, 2018d).

The Project area is part of the industrial-port complex that includes the Port of Québec, a paper mill, municipal waste treatment facilities, and the recreational and tourism infrastructure and businesses described in Section 5.8. The Baie de Beauport Recreational Park is on the boundary of the current port facilities. This sector offers public access to the St. Lawrence River and a beach. Pointe-à-Carcy and

Bassin Louise are places of recreational and tourist interest located within the boundary of the port facilities (Englobe, 2018c).

To address the Project's impact on the quality of life, the Proponent looked at the nuisance generated by land traffic related to current operations of the harbour, as well as the acoustic, atmospheric, visual and lighting (nighttime luminosity) elements in the study area.

For the analysis of the nuisances generated by traffic, the Proponent carried out a traffic study of the routes most commonly used by trucks.

Based on noise surveys conducted in the field in 2014 and 2017, current noise levels include noise from the existing port area, the White Birch Paper mill, rail and road traffic. For all sectors analyzed, noise is higher during the day than at night (Englobe 2018b). The highest value during the day was recorded in the Beauport sector, while during the night, the Old Québec City sector was the noisiest. Overall, the ambient noise index complies with current regulations (Englobe, 2020y). However, the current reference noise levels are above the World Health Organization (WHO) nighttime guide values (55dBA).

With respect to nighttime light intensity, the Proponent mentions that the current lighting fixtures in the harbour, particularly along wharves 52 and 53, contribute to the lighting environment in the construction zone, but also in the expanded study area (Lévis area, Île d'Orléans and Beauport area) (Englobe 2018b). The luminosity of the Port of Québec (halo light or glare) slightly modifies the visual aspect of the Beauport sector from certain locations visited (Englobe, 2020y). However, the current reference noise levels are above the World Health Organization (WHO) nighttime guide values (55dBA).

Three drinking water supply intakes are located within or near the administrative boundary of the Québec Port Authority: two in Lévis and one 18 kilometres upstream from the construction zone. The Proponent carried out plume dispersion modelling of the overflow effluent from Québec City and considers that the water intakes in Lévis are currently not significantly affected by the effluent.

The baseline air quality condition is summarized in Section 5.1. The Proponent reports information from two studies conducted by the Direction régionale de la santé publique de la Capitale-Nationale du Québec (DRSP) on exposure to airborne particles (DRSP, 2013 and 2015). According to the DRSP, the health effects of a given substance can be numerous and can manifest themselves in different ways depending on the individual. Also according to the DRSP, the borough of La Cité-Limoilou presents a combination of environmental and public health risk factors that merits a global and concerted approach to air quality. With this in mind, the DRSP created the *Comité intersectoriel sur la contamination environnementale dans l'arrondissement La Cité-Limoilou* (CICEL), which brings together public and private organizations, authorities or bodies concerned with air quality in the area and whose mandate is to implement measures to reduce the concentrations of certain fine particles in the ambient air. The Proponent is one of the members of this committee (Englobe, 2020y).

Additional Information on the Project's Implementation Environment

Since the Project takes place in an environment that, according to the DRSP, presents a combination of environmental risk and nuisance factors for population health, and where air quality is recognized as a problem, the Agency considers it important to provide a more detailed description of the population likely to be affected by the Project.

In 2016, the borough of La Cité-Limoilou had 107,885 inhabitants, or 20.3% of the city's population (Ville de Québec, 2020). The median household income is much lower than that of all households in the Capitale-Nationale region[37], i.e., 35% lower in Basse-Ville and 34% lower in Limoilou-Vanier (CIUSS-CN, 2018). When compared to the overall Quebec population, these same neighbourhoods show significant disparities in several indicators of social inequality and health determinants, including the proportion of families living on low income, social assistance recipients, vulnerable children and school dropouts.

Among the sensitive receptors within the expanded study area, the Proponent has identified 1,737 residences and buildings close to the Project site, including 19 early childhood centres (*Centres de la petite enfance CPE*) and daycare centres, 86 schools, seven community and recreation centres, 19 places of worship, 4 libraries, 87 parks and public squares, 13 public accesses to the river, a beach and other sites of interest. Several health care institutions that receive a significant number of users and employees are also present, including the Hôtel Dieu Hospital, the Enfant-Jésus Hospital, a local community service centre (*Centre local de services communautaires CLSC de Limoilou*), a residential and long-term care centre (*Centre d'hébergement et de soins de longue durée CHSLD de Limoilou*) and a university institute in mental health (*Institut universitaire en santé mentale de Québec*, formerly *Centre hospitalier Robert-Giffard*) (Englobe 2020y).

5.7.2 Analysis of Potential Effects and Proposed Mitigation Measures

The potential adverse effects identified by the Proponent on human health, both physical and psychological, are the risk of accidents resulting from increased truck and train traffic in the vicinity of the Project site[38], damage to physical and psychological health resulting from nighttime luminosity, air quality and noise resulting from Project construction activities, and increased traffic in the lanes near the Project site. Also, the Proponent mentions the risks of contamination of drinking water sources and swimming water as potential health effects of the Project.

[37] The Capitale-Nationale du Québec region refers to Administrative Region 03 of the Province of Quebec, which includes Québec City, as well as the Regional County Municipalities of Portneuf, La Jacques-Cartier, Île d'Orléans, La Côte-de-Beaupré, Charlevoix and Charlevoix-Est.

[38] Accident risks arising from the increased traffic generated by the Project are discussed in the "Other Considerations" section.

Physical and Psychological Health Impacts Resulting from Changes in Air Quality

In order to assess the health effects of changes in air quality, the Proponent conducted a Human Health Risk Assessment (HHRA). To do so, it relied on the air emission modelling study mentioned in Section 5.1. The objective of the HHRA was to quantify the potential health risks associated with air emissions of contaminants of potential concern (COPCs) associated with Project activities. The HHRA sought to determine whether these risks would exceed the acceptable thresholds set out by government authorities. The Proponent considered the sources of air emissions associated with the Project during the construction and operational phases, as identified in the modelling (Section 5.1). The Proponent examined the following exposure pathways: inhalation of gas- and particle-phase pollutants, ingestion and dermal contact with contaminants deposited as dust, and ingestion of food from a local vegetable garden. As for contaminants of potential concern, the Proponent selected those whose maximum concentrations would potentially be emitted during the construction and operational phases and which are strongly correlated with adverse health effects when concentrations exceed guide values. These contaminants are fine particulate matter ($PM_{2.5}$) and inhalable particulate matter (PM_{10}), nitrogen dioxide (NO_2), total particulate matter (TPM), 1.3-butadiene, acetaldehyde, formaldehyde, polychlorinated biphenyls (PCBs), arsenic and nickel. The effects of these contaminants would primarily impact the cardiorespiratory and cardiovascular systems of vulnerable populations (children, elderly, and people with fragile health). Contaminants that exceed these levels are associated with increased short-term mortality, cardiopulmonary mortality, hospitalizations for cardiac or respiratory disorders (asthma, bronchitis, emphysema, respiratory tract infections, etc.), absenteeism, complications for people with chronic diseases and other health effects (Englobe 2020y).

Diesel Particulate Matter (DPM) was not identified as a contaminant of potential concern because, according to the Proponent, its maximum concentrations (baseline plus Project) would not exceed 10% of the standard. Note that the baseline state for diesel particulate matter is unknown, only the Project contribution was modelled. The contaminants of potential concern selected were those with maximum concentrations exceeding the standard by 75%. Nevertheless, the Proponent calculated the incremental cancer risk of chronic exposure to diesel particulate matter (Englobe 2020y).

Three scenarios were considered to assess exposure to contaminants of potential concern: the baseline conditions, construction phase and operational phase. The Proponent also assessed the risks to human health associated with exposure to concentrations of fine particulate matter ($PM_{2.5}$), nitrogen dioxide (NO_2) and sulphur dioxide (SO_2) that would result from the Project using data from epidemiological studies on the relationships between different pollutant concentrations and different health effects. Risks were calculated for sensitive receptors such as residents of nearby areas (Limoilou neighbourhood), users and workers in the recreational area of the Baie de Beauport, and workers in the industrial sector adjacent to the Project. For example, with respect to NO_2, the Proponent used studies reported in the Human Health Risk Assessment of Ambient Nitrogen Dioxide (Health Canada, 2016) that show an increased risk of 1 to 13% of hospital visits/hospitalizations for various respiratory problems (e.g., asthma, bronchitis, emphysema, respiratory tract infection) associated with an average daily increase of 20 parts per billion (ppb) or hourly increase of 30 ppb of NO_2. Based on these studies, the Proponent calculated the health risks that would occur when, for example, a concentration of 230 micrograms per cubic metre ($\mu g/m^3$) would be reached (which represents the maximum value modelled for NO_2 over an hourly period); an increased risk of hospital

visits/hospitalizations of between 2 and 30% for different respiratory causes (e.g., asthma, bronchitis, emphysema, respiratory tract infection, etc.) would result. For $PM_{2.5}$, an annual concentration of 10 µg/m3 would theoretically result in 0.35 to 0.77 additional annual cardiopulmonary deaths, 0.66-1.0% increase in mortality after two years in individuals with certain chronic diseases, and 0.3% increase in the risk of premature death from non-accidental causes (Englobe, 2020y).

For fine particulate matter ($PM_{2.5}$), the Proponent assesses that there would be no exceedance affecting sensitive residential and recreational receptors or workers, other than workers in the area who may be exposed by inhalation to $PM_{2.5}$ (within a period of 24 hours). According to the Proponent, fine particulate matter emissions would have little effect on health during the operational phase.

With respect to exposure to nitrogen dioxide (NO2), an increase in bronchial responsiveness may occur in asthmatic individuals if hourly or daily maximum concentrations are reached. In the worst-case scenario simulated by the Proponent, if hourly maximum concentrations were reached, individuals could experience acute health effects. During the operational phase, exceedances could occur in total NO_2 concentrations and these could contribute to an increased risk for individuals with pre-existing heart or lung conditions, as well as for seniors and children, particularly during the warm season.

The Proponent also assessed the human health risks of other contaminants of potential concern during the construction phase. According to the Proponent, the human health risks associated with exposure to nickel, arsenic, 3-butadiene and polychlorobiphényles (PCBs) would be entirely, or largely, attributable to the baseline condition in the area. During the operational phase, there would also be exceedances of the 1.0 threshold (TPM) for annual workers, as well as exceedances (1 to 4 additional cases of cancer per 100,000 inhabitants) of the acceptable incremental cancer risk threshold established in Quebec.

According to Health Canada, the Human Health Risk Assessment submitted by the Proponent complies with the methodological framework for risk assessments recommended by competent organizations in the field (e.g., Health Canada, INSPQ). However, the analysis submitted is closer to a preliminary quantitative risk assessment (PQRA). Health Canada explains that a PQRA is usually conducted using limited site information and is intended to provide a rough but conservative estimate of potential risks to human health. PQRAs are generally viewed as tools to validate the absence of unacceptable risks to human health rather than to adequately quantify the risks associated with a Project. As such, the results of the air quality risk assessment in the context of the Project must be interpreted in the context of the specifics of a PQRA.

Health Canada has identified several sources of uncertainty related to the Proponent's Human Health Risk Assessment (HHRA), the main ones being:

- Exposure to soil or sediment on Beauport beach and to water has not been considered, despite the fact that project-related dust could be deposited there. The Proponent judged that these environments would retain only a negligible quantity of particles.
- Only the risks associated with the construction phase have been calculated.

- Concentrations calculated at the point of maximum impact (often just outside the property limits of the Port of Québec) were used to estimate risk, rather than concentrations representative of the city borough. This choice has the effect of overestimating the risk.

According to Health Canada, the Proponent's HHRA shows that the construction phase would not contribute significantly to the risks for air contaminants other than particulate matter and NO_2, with the exception of acute exposure to formaldehyde, for workers in the Baie de Beauport recreational area and in the industrial area. The calculated risks for arsenic, nickel and PCBs are almost entirely attributable to the risks associated with the baseline conditions.

In March 2021, the Proponent submitted a sensitivity and uncertainty analysis associated with the health risk calculations (MESIQ Inc., 2021) following the assessment of human health risks associated with air quality (Englobe, 2020y). The analysis of MESIQ Inc. (2021) was intended to refine estimates of human health risks since the method used in 2020 would, according to the authors, lead to an overestimation of health risks.

According to Health Canada, the analysis submitted by the Proponent was conducted as a whole according to the proposed directions (Health Canada 2010; U.S. EPA 2001) and allows for a more nuanced look at the risk to human health that would be attributable to the Laurentia Project (other than using maximum values). Considered in conjunction with the other studies and analyses presented in the evaluation, it provides a portrait of the Laurentia Project's contribution to human health risks associated with air pollution and highlights that the majority of exceedances and risks are attributable to the baseline.

Furthermore, Health Canada points out that the notion of population vulnerability was not integrated into the Proponent's analysis. From a human health protection perspective, two similar projects producing the same air emissions (and having the same effect on air quality) may have different health effects depending on their location and the characteristics of nearby populations. In this case, the Project would be located near residential areas inhabited by a vulnerable population and marked by social inequalities in health.

Health Canada wishes to reiterate that the *Canadian Ambient Air Quality Standards* (CAAQS) of the Canadian Council of Ministers of the Environment for $PM_{2.5}$ and NO_2 do not establish a discernable threshold for the protection of human health and therefore any increase in exposure would result in a further increase in risk in the population, particularly in vulnerable populations including children and the elderly.

Finally, the cancer risk generated by the Project was calculated by the Proponent for particulate matter from diesel engines (without considering the initial or existing concentrations). The results presented in Appendix E of Englobe (2020y) show that using the unit factor of the California Environmental Protection Agency (CalEPA), the calculated risks for a lifetime in the Limoilou area (using the maximum concentration in the area) amount to 1.35 cases per 100,000 inhabitants and exceed the risk deemed acceptable by the Institut national de la santé publique du Québec of 1 case per million inhabitants (Institut national de la santé publique du Québec, 2012). Risks to recreational receptors, Baie de Beauport's seasonal workers, as well as workers in the nearby industrial sector would also exceed this threshold generally considered acceptable.

The Proponent believes that, during the construction phase, the application of the planned air quality measures (Section 5.1) would reduce the Project's effects on the quality of life and human health. In addition, the existing air quality-monitoring program would validate the application and effectiveness of mitigation measures. For the operational phase, the measures applied would also be those proposed for air quality (Section 5.1), including the maintenance of air quality monitoring in collaboration with the Ministère de l'Environnement et de la Lutte contre les changements climatiques (MELCC) and the Proponent's participation in the Comité intersectoriel sur la contamination environnementale dans l'arrondissement La Cité-Limoilou (CICEL).

Health Canada reports that exceedances due to elevated baseline concentrations would remain even after the application of mitigation measures incorporated into dispersion modelling scenarios. In this sense, the Project would result in air quality and human health effects that cannot be mitigated for both the construction and operational phases.

Health Canada recommends that the Proponent implement, in addition to standard mitigation measures, the best available means to avoid or to limit air emissions during all phases of the Project. In particular, additional mitigation measures would be required to reduce emissions of fine particulate matter ($PM_{2.5}$), nitrogen dioxide (NO_2), nickel, formaldehyde and particulate matter (PM) from diesel engines.

The public expressed concerns about human health risks related to population vulnerability, potential exceedances of fine particulate matter ($PM_{2.5}$), nitrogen dioxide and additional risks of different types of cancer, and other potential human health effects related to air quality changes generated by the Project. For its part, the Association Québécoise des médecins pour l'environnement (AQME) is of the opinion that the Project should not be authorized as long as the current and projected levels of air pollutants in the boroughs of La Cité-Limoilou and Beauport are not below the standards of the MELCC's *Règlement sur l'assainissement de l'atmosphère* (RAA) and the Canadian Council of Ministers of the Environment's *Canadian Ambient Air Quality Standards* (CAAQS) 2025.

The AQME also points out that, according to the *Plan directeur des milieu naturels et de la forêt urbaine de la Ville de Québec*, the Limoilou and Beauport sectors are deficient in natural infrastructures and urban canopies. These sectors are home to huge heat islands that are harmful to health. The AQME points out that the proposed expansion would add a mineralized area to an already heavily mineralized sector. Several citizens have also raised this concern.

Damage to Physical and Psychological Health Resulting from Noise Caused by Project Activities

The use of machinery during the construction phase would be the main source of noise[39]. During the operational phase, noise would come from port operations, land and marine traffic, maintenance dredging and land-based sediment management (Englobe 2020v).

[39] See Table 5 in Chapter 2 for a description of the Project's construction work.

The Proponent points out that various health effects can result from continuous, short-term or occasional exposure to high noise levels at night. Depending on the intensity of the exposure, the effects may include insomnia, drowsiness or fatigue during the day, leading to deficits in concentration, depressed mood, irritability, but also cardiovascular disease, changes in certain metabolic functions and a decrease in neurocognitive performance. In addition, noise can create stress responses in some people, which can lead to other health problems such as cardiovascular disease, ulcers and diabetes (Englobe 2020y). In addition, noise can generate subjective effects or nuisances leading to negative emotions influenced by factors such as fear, sense of trust in the community, media treatment, the usefulness or importance of the noise emitter in social or economic terms, and population expectations (Englobe 2020y).

The results of noise modelling indicate that, for the construction phase, the Project's effects on the environment would be low, since the noise levels obtained would be lower than Health Canada's indicator for the proportion of people strongly annoyed by noise (%HA) and the provincial and municipal standards. However receiving points P1 and P2 in Levis would experience exceedances at fall of year one and fall of year two due to daytime pile driving. Nevertheless, the installation of an acoustic enclosure around the pile during pile driving would limit, according to the Proponent, noise level increases.

The Ministère de l'Environnement et de la Lutte contre les changements climatiques (MELCC) is of the opinion that according to the noise environment modelling presented by the Proponent, the requirements of the MELCC's *Lignes directrices relativement aux niveaux sonores provenant d'un chantier de construction industriel* would be respected.

During the operational phase, the modelled noise levels would also meet federal indicators. According to the Proponent, the construction and operational scenarios demonstrate that the noise impact on health would be very low, or even nil for certain situations. The difference between the percentage of the population severely annoyed (%HA) in baseline conditions (ambient noise) and in the presence of future construction and operations is between 0.0 and +1.9%, which is well below the significant threshold of +6.5[40] (Englobe, 2020v). In that respect, Health Canada emphasizes that this federal criteria and provincial or municipal limits should not be considered acceptable levels of noise pollution or thresholds below which no health effects occur. Noise levels should be kept as low as reasonably achievable.

The Proponent proposes other mitigation measures during the construction phase, in addition to the sound enclosure mentioned, such as using manufacturers' mufflers for equipment, prohibiting the use of engine brakes, minimizing the slamming of truck rear panels, carrying out certain construction activities such as sinking during the day, limiting the speed limit to 15 kilometres per hour and communicating the work schedule to all committees acting as stakeholders. For the operational phase, measures include, among

[40] The percentage of the highly annoyed population (%HA) is used to calculate how a typical community responds to a given level of noise (dose-response relationship between noise levels and annoyance generated according to ISO-1996-1). Health Canada recommends that noise impact be assessed based on changes in %HA for populations exposed to noise over the long term (more than one year). According to Health Canada, several studies establish a 6.5% increase in HA as a criterion for determining the existence of a serious noise-related impact on a project (Health Canada, 2017).

others, the acquisition of gantry cranes equipped with electric motors rather than hybrid electric/diesel motors, the installation of reactive gas exhaust silencers for the new generators, white noise back-up alarms and the reduction of unnecessary equipment movements.

Although the study shows some significant increases, the MELCC considers that the noise levels required under the MELCC instruction note *Traitement des plaintes sur le bruit et exigences aux entreprises qui le génèrent* (*Note d'instruction 98-01*) are respected, with the exception of the downtown Levis sector. On the other hand, in the operational phase, the provincial criteria of *Note d'instruction 98-01* (10 dB difference between dBC and DBA) would be reached in some places and would be between 14 and 20 dB, day and night, for all the measurement points evaluated. Also, the average impact noise during operation would not be negligible. Thus, for the operational phase, the MELCC concludes that it is possible that low-frequency noise such as impact noise could constitute additional disturbances for the local population.

Health Canada asserts that the methods used by the Proponent to assess potential noise impacts are appropriate for this type of Project. However, certain methodological aspects could have introduced uncertainties in the modelling results for the operational phase and lead to an underestimation of the total noise attributable to the Project. For example, impact noise from railcar switching (during yard operations on-site and in the nearby marshalling yard), noise from ships moving to and from the port, and idling of trains and transport trucks during loading do not appear to have been considered in the modelling.

With respect to the effects of noise, Health Canada considers that the Proponent adequately and sufficiently describes and documents the baseline environmental noise. Similarly, the methodology used to assess the potential noise impacts and the increase in the percentage of people highly disturbed by noise (%HA) is appropriate for this type of Project, despite the uncertainties mentioned above.

Furthermore, Health Canada considers that the Proponent's assertion that noise sources would be masked by noise from urban activities located near the facilities does not appear to be supported by calculations presented in its noise environment documents. On the contrary, the calculations show that project-related noise levels may exceed ambient noise levels at some locations. Depending on the characteristics of the noise (tonal, impulsive, very impulsive, continuous, intermittent, frequency, etc.), there could be an increase in noise nuisance. According to Health Canada, one should avoid asserting that the existing industrial-urban fabric will mask the dominant sources of noise emissions. Indeed, the human response to specific sound events, to reduce quiet times, and to different sound spectra can be highly variable and may lead to increased nuisance or sleep disturbance, without changing average sound pressure levels.

In the choice of comparison criteria used, the Ministère de la Santé et des Services sociaux (MSSS) also recommends that the acoustic analysis satisfy the recommendations of the World Health Organization (WHO) in order to protect health and limit the disturbance caused by noise.

The Proponent proposes other mitigation measures during the construction phase in addition to the acoustic enclosure mentioned, such as the use of manufacturers' mufflers for equipment, the prohibition of engine braking, the minimization of the slamming of the rear panels of trucks, the carrying out of certain construction activities such as sinking during daylight hours, the limitation of speed to 15 hm/h and the communication of the work schedule to all committees acting as stakeholders. For the operational phase, the measures

include, among others, the acquisition of gantry cranes equipped with electric motors rather than hybrid electric/diesel motors, the installation of reactive exhaust silencers for the new generators, back-up alarms with a wide frequency range that respect safety standards and the reduction of unnecessary movements of equipment.

The Association Québécoise des médecins pour l'environnement (AQME) specifies that the noise emitted by railroad yards comes mainly from the impact between cars during the assembly and disassembly of trains and from the squeaking of the track brakes. The AQME proposes measures to reduce rail noise, including:

- General grinding of the tracks;
- Lubrification of tracks (friction reduction) in areas where there is squeaking.

The public has expressed concerns about the potential nuisance caused by noise to nearby neighbourhoods and users of the Baie de Beauport. Noise sources of concern to the public include, for example, construction site activities, container-handling equipment, and other port operations in general including train and ship traffic and manoeuvres as well as trucking. In particular, it is mentioned that impact noise affects the quality of life and health or residents.

Risks and Health Effects of Contamination of Drinking and Bathing Water Sources

According to the Proponent, the dredging work and the presence of numerous trucks transiting through the construction zone could be sources of suspended solids emissions affecting the quality of drinking and swimming water during the construction phase. The mitigation measures related to surface water quality (Section 5.4) should, according to the Proponent, reduce the risk of potential contamination of these waters, particularly in the swimming areas of Baie de Beauport. These measures are also intended to protect drinking water intakes located in the study area. For the operational phase, the Proponent states that its Project would result in a decrease in the concentration of the plume from the overflow effluent to the Lévis and Québec City (Sainte-Foy sector) water intakes. No effect would then be experienced on the health of people consuming water from these intakes (Englobe 2020y). In addition, maintenance dredging could cause an increase in suspended solids and alter water quality in the St. Charles River estuary and Baie de Beauport beach areas. According to the Proponent, mitigation measures to reduce suspended solids would limit the effects of the Project on swimming water.

The public has expressed concerns about the risk of contamination and the quality of water for swimming at Baie de Beauport, as well as the contamination of drinking water sources in the area. The main potential sources of contamination identified by the public are the increase in container ships, construction activities, filling of caissons on the wharf line, dredging and sediment management, among others.

5.7.3 Agency Analysis and Conclusions on Residual Effects

Analysis of the Effects

Air quality is a major determinant of health (Direction de santé publique, 2019). Despite the small contribution of the Project to air quality degradation, the Agency notes that the Project is implemented in a residential area inhabited by a vulnerable population and marked by social inequalities in health related, in particular, to air quality. This conclusion is shared and emphasized by experts from federal and provincial departments, the Proponent and the public. Based on advice from Environment and Climate Change Canada, the Agency notes that the Project would increase particulate matter emissions into the air as well as the presence of contaminants resulting from the use of fossil fuels during both phases of the Project, in a sector already saturated for certain air contaminants. The Agency concludes that, due to the proximity of neighbouring populations, their vulnerability and potential health risks, including an increased risk of cancer for particulate matter from diesel engines, the Project would have significant residual human health effects related to air quality. The Project would also contribute to replace a water surface (St. Lawrence River) by a mineralized space creating a heat island in a sector already in deficit of green space. It should be noted, however, that the green screen project proposed by the developer could reduce this effect by planting trees.

Also, the Proponent calculated additional cancer risks related to particulate matter from diesel engines. According to his calculations, the lifetime risks in the Limoilou residential sector would be 1.35 cases per 100,000 inhabitants, which exceeded the acceptable risk of 1 case per million inhabitants of the Institut national de la santé publique du Québec (2012). The risks for recreational receptors and seasonal workers in Beauport Bay, as well as for workers in the nearby industrial sector, would also exceed this generally considered acceptable threshold.

With respect to the health effects related to the risk of contamination of drinking and swimming water, the Agency is satisfied with the mitigation measures that would be applied, particularly during dredging, and considers that there would be little effect on drinking or swimming water.

The Agency considers that if noise levels measured in the field during construction and operation are similar to those modelled, project-related noise is not expected to have a significant effect on the health of neighbouring populations. However, the implementation of the mitigation measures presented in the impact statement is essential to limit the significance of the effects. Based on Health Canada's advice, the Agency considers that a monitoring and follow-up program is necessary to verify the accuracy of the models used and the actual effectiveness of the noise mitigation measures, both during the construction and the operational phases. Complementary mitigation measures should be put in place in the event that noise proves to be problematic, in consultation with the community.

Agency's Conclusion

At the end of its analysis and according to the assessment criteria and analysis grid presented in Appendix A, the Agency concludes that the significant adverse environmental effects on air quality related to the Project could cause significant risks to human health. The Agency's conclusion is based on the following elements:

- Existing exceedances observed in the receiving environment for some contaminants, including particulate matter, NO_2 and nickel;
- The location of the Project near a residential area and a vulnerable population presenting social inequalities in health;
- The potential health risks, including those related to air quality, including the additional cancer risk generated by the Project for particulate matter from diesel engines;
- Uncertainties inherent in air contaminant dispersion modelling and human health risk assessment;
- Emissions of contaminants of potential concern or particulate matter generated by the Project that would approach or exceed the CAAQS standards or MELCC (CAR) criteria.

These effects could occur despite project optimizations and the application of the key mitigation measures detailed below, as well as the measures specified in Sections 5.1 and 5.4. The Agency concludes that the significance of the effects would be high for the following reasons:

- The intensity of the risks to human health would be high, as exceedances of levels of contaminants of potential concern could result in potential human health effects due to exposure to contaminant levels that exceed applicable physical health protection standards and criteria in a vulnerable population that is already experiencing significant air quality pressures;
- The Project would result in long-term local modification since the risks to human health would extend beyond the Project site and the effects would be felt over a period of more than five years;
- Risks to human health would be continuous during the operational phase and partially reversible to irreversible depending on the type of risk.

Identification of Key Mitigation Measures

The Agency has identified the main mitigation measures that are likely to mitigate some of the Project's potential effects on human health. However, in the case of the potential effects of air quality on human health, these measures taken together would not sufficiently mitigate the potential effects of the Project to render the residual effects insignificant. To identify the key mitigation measures, the Agency took into account the mitigation measures proposed by the Proponent, the advice of government authorities, as well as comments received from the public.

Specific Measures for Noise

Construction and Operational Phases

- Develop and implement an information and consultation plan to involve the community of potentially affected receptors, prior to any particularly noisy activity, to better understand when noise sensitivity could increase and plan the work in consideration of the findings of this consultation and implement mitigation measures if necessary;
- Develop a pre-construction protocol, in consultation with potentially affected parties, for receiving complaints related to noise exposure from the Project. Implement the protocol in all phases of the Project. The protocol shall be submitted to the Agency prior to construction. The Proponent must respond to noise complaints related to any component of the Project within 48 hours of receipt of the complaint and implement corrective measures, if necessary, to reduce noise exposure in a timely manner;
- Implement measures during construction and operation to mitigate exposure to noise from the Project that take into account the mitigation measures described in Appendix H of Health Canada's *Guidance for Evaluating Human Health Impacts in Environmental Assessments: Noise*;
- Not to exceed the noise limits included in the Lignes directrices relativement aux niveaux sonores provenant d'un chantier de construction industriel and in the Note d'instruction 98-01 sur le bruit from the Ministère de l'Environnement et de la Lutte contre les changements climatiques during construction and operation, respectively;
- Conduct pile driving activities and any other activity that generates tonal, impulsive or highly impulsive noise Monday through Friday during the day (7:00 A.M. to 7:00 P.M.), unless it is not technically or economically feasible. If the Proponent is to conduct any pile driving or other activity that generates tonal, impulsive or highly impulsive noise on Monday to Friday evenings or nights (7:00 P.M. to 7:00 A.M.), weekends or holidays, the Proponent shall notify the community prior to undertaking the activity;
- Train workers and contractors on the importance of noise mitigation;
- Equip equipment with silencers when possible;
- Turn off unused electrical or mechanical equipment and trucks waiting for a load for more than the normal waiting time;
- Implement physical measures such as sound barriers for noise generating equipment, low frequency equipment and impact noise;
- Equip equipment (e.g., shovel and loader) with a wide-band back-up alarm adjusted to obtain a maximum sound level of 10 decibels (dBA) above the surrounding noise of the work site, while respecting health and safety standards;
- Develop and implement a periodic preventive maintenance plan for rail within the Proponent's property boundary, including rail grinding and lubrication, to mitigate noise from rail operations during operation.

Construction Phase

- Prohibit the use of engine brakes on the job site unless safety is an issue;
- Minimize slamming of the rear panels of trucks when unloading materials;
- Drive the piles by vibratory driving. If pile driving is required, use loudspeakers around the piles. These sound enclosures should reduce the sound power (Lw) generated by pile driving by at least 10 dBA;
- Limit pile-driving activities to the daytime period only between 7:00 a.m. and 7:00 p.m.;
- Pay particular attention to the attenuation of tonal, impulsive and very impulsive noises (such as pile driving) and avoid these types of noise at night, on weekends and holidays.

Operational Phase

- Acquire gantry cranes equipped only with electric motors instead of hybrid motors (electric/diesel);
- Equip new generators with reactive exhaust mufflers;
- Install mechanical equipment away from sensitive receptors identified by the developer in Figures 3-1 through 3-6 of Englobe (2020n);
- Locate, when possible, mechanical equipment (pumps, motors, etc.) in buildings;
- Optimize the sequence of operations by reducing unnecessary equipment movements;
- Turn off unused electrical or mechanical equipment and rail convoys awaiting loading whenever possible;
- Operate the truck access gate only from Monday to Saturday (between 6:00 A.M. and 4:00 P.M.).

Need for Follow-up and Follow-up Requirements

Uncertainties were raised regarding the accuracy of the models used to determine the significance of noise during the construction and operational phase and the effectiveness of mitigation measures. In order to verify the predictions of the effects of the Project on the noise environment as well as the effectiveness of the proposed mitigation measures, the Agency recommends that the follow-up program, which includes the following requirements, be developed and implemented:

- Develop, prior to construction and in consultation with the relevant authorities, a follow-up program to verify the accuracy of the environmental assessment and to assess the effectiveness of the mitigation measures with respect to the noise environment. The Proponent shall submit the follow-up program to the Agency prior to the commencement of construction. This follow-up program must:
  - Monitor, during construction and operation, all sources of noise emissions, including impulsive and low frequency noise. The Proponent shall conduct monitoring during the day and night and during each season;
  - Consider the noise levels anticipated during the environmental assessment and the applicable noise limits in the Lignes directrices relativement aux niveaux sonores provenant d'un chantier de construction industriel and in the Note d'instructions 98-01 sur le bruit from the Ministère de

l'Environnement et de la Lutte contre les changements climatiques during construction and operation

- Modify existing measures or develop and implement additional mitigation measures if monitoring results demonstrate that measured noise levels are higher than those predicted in the Proponent's impact statement, particularly in the event of public complaints;
- Acknowledge any complaint related to noise exposure attributable to the Project as promptly as possible, or within 48 hours of receipt of the complaint, and implement, as soon as technically feasible, any corrective action under the control of the Proponent in response to any complaint received, which may include modified or additional mitigation measures or monitoring requirements.

5.8 Socio-Economic Conditions

The Project could have negative residual effects on socio-economic conditions related to Québec City tourism, commercial shipping, recreational and tourism activities, including sailing in Beauport Bay, and commercial and recreational fishing, particularly through the presence and operation of the new facilities and project-related activities.

The Agency is of the opinion that these effects are likely to be significant, even with the implementation of mitigation, monitoring and follow-up measures.

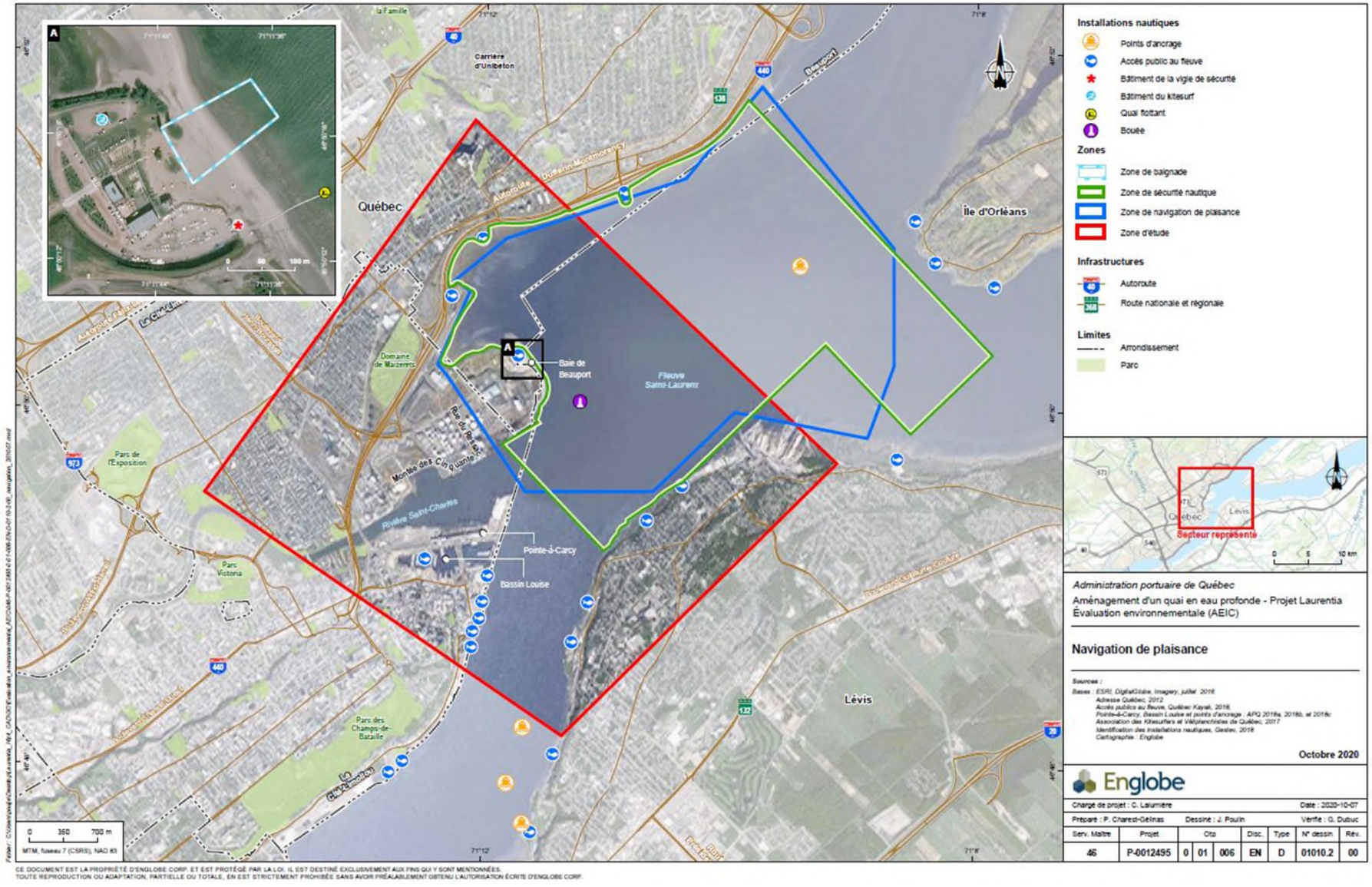
The following subsections present the information the Agency considered in its analysis in order to reach conclusions on the significance of the Project's effects on socio-economic conditions, including the advices and comments of expert departments, First Nations consulted and the public.

5.8.1 Description of the Component "Socio-economic Conditions Component"

The analysis of the socio-economic effects focuses on recreation and tourism activities (tourism, river access, nautical activities, swimming), recreational and commercial fishing, and commercial navigation in Baie de Beauport. The effects of the Project on the socio-economic conditions of First Nations uses, as well as the effects on indigenous fisheries are discussed in Section 5.9. Furthermore, the Agency has no information indicating that the Project could affect the practice of indigenous commercial fisheries or any other aboriginal activity in the Proponent's area of jurisdiction.

The Project is located on Crown land, i.e., on federal land managed by the Québec Port Authority. The area selected by the Proponent to assess the Project's effects on socio-economic conditions is the extended study area (Figure 3, Chapter 1). The Proponent has identified two major sectors that correspond to the two types of economic activities that characterize the Beauport sector of the Port of Québec: first, to the north, a recreation and tourism sector including, in particular, the Baie de Beauport Park with its public access to the river and the beach (Figure 10); and to the south, a sector dedicated to port activities with the existing bulk solid and liquid terminals (Englobe 2020p; 2018d).

Figure 10: Location of swimming, boating safety areas.



Source: Englobe, 2020p

Recreational Activities and Access to the St. Lawrence River in the Study Area

Québec City is a popular destination well-known to tourists around the world. According to the Ministère du Tourisme du Québec, tourism generated nearly $1.6 billion in spending in the Québec City region in 2017.

According to the Proponent, the extended study area has a number of services and river access points. On the Port of Québec site, in the St. Charles River estuary sector and, in particular, at Pointe-à-Carcy, there are a number of recreational and tourism facilities and activities, such as the Royal Canadian Navy, museums, boat tours, outdoor shows and the Ross-Gaudreault Cruise Terminal. The southwestern end of the study area encompasses the Old Québec recreation and tourism area and the Anse au Foulon sector of the Port of Québec. In the northwestern portion of the study area, Domaine Maizerets also offers year-round recreational and tourism activities. On the south shore, use of the Paquet Wharf site in Lévis has been growing since 2016. In addition to being a promenade and a public square, the site hosts various summertime shows, festivals and events (Englobe 2018d).

The sector in which the Project is located is the epicentre of the summer entertainment program and the docking site for international cruises on the Québec City side. The area has a number of launch ramps for recreational boating. The beach at Anse Gilmour Park, Anse-Tibbits in St. Lawrence Park, Grève-Jolliet Park, and the Parcours des Anses bicycle path are popular places for water sports, cycling and walking. The same is true for the sector at the western tip of Île d'Orléans, where there are public river access points for kayaking and other recreational and tourism services, including shops and walking areas at Anse aux Canots and Anse du Fort in Sainte-Pétronille, and the launch ramp on Horatio-Walker Street (Englobe 2018d).

Near the Project, the Beauport Bay recreation and tourism site is highly valued by the public because of the presence of a beach and convenient access to the St. Lawrence River. The site was redeveloped as part of the Government of Canada's initiatives to commemorate the 400th anniversary of the founding of Québec City in 2008 and with the aim of improving residents' access to the St. Lawrence River shoreline (CJB Environment Inc. 2006).

According to the Proponent, the Beauport Bay site is a popular location for boating because it is partly sheltered from the river's strong currents. The site offers the necessary facilities for various types of water sports: kayaking, kitesurfing, light sailing, jet-boarding, canoeing, paddle-boarding and other sailing activities. The beach's recreational and tourism uses contribute to the economy of the extended study area (Englobe 2018d).

According to a survey conducted by the site manager, visitors to Beauport Bay are mostly families (64%), and the main reason for visiting is swimming (57%). Most visitors are residents of the Québec City region (78%), but the site is also a tourist attraction, as 22% of its visitors are from outside the region, including 5% from outside Quebec. Beauport Bay had about 80,000 users a year in 2016 and 2017 (Englobe 2018d).

Sailing Activities

According to the Proponent, there is kitesurfing in Beauport Bay between April and December, and light sailing, which includes catamarans, dinghies and windsurfing, from May to October. Beauport Bay has a sandy launching area that is ideal for safe kitesurfing and light sailing. Companies offer equipment and boat rentals and courses in kitesurfing and light sailing. There are also friendly races organized by the Station Nautique de la Baie de Beauport (Englobe 2018d). Many local groups, particularly the Regroupement des usagers de voile légère de la Baie de Beauport (RUVL) and the Association des kitesurfeurs et véliplanchistes de Québec (AKVQ), point out how important the Beauport Bay site is for non-motorized water sports. In their view, the site's characteristics (shallow beach, high visibility from land for safety, winds, etc.) are ideal and rare in the region for learning, training, practice and competitions.

According to the RUVL, the boating area between the beach and Île d'Orléans and between the south and north shores of the St. Lawrence River provides a vast expanse that can be monitored by marine watch. It also allows for safe boating due to the configuration of the bay, which is outside the St. Lawrence shipping channel and sheltered from the strong currents. In addition, according to the AKVQ, because of the configuration of the beach and the direction of the prevailing winds, users frequently sail perpendicular to the shore and close to shore. Consequently, in the event of an incident (collision, lack of wind, mechanical breakdown, etc.), users are near the beach. More experienced users who sail further out are still within the 180-degree field of view of the marine watch service. The watch service is equipped with a semi-rigid boat for quick and efficient rescue operations. Kitesurfers have sufficient space (approximately 60 metres) on the site to deploy the kite from their kitesurf board without inconveniencing swimmers. According to the AKVQ, Beauport Bay is currently the only safe place for learning to kitesurf in the greater Québec City area. Both groups also note that various uses, including water sports, outdoor activities, wildlife watching and family activities, can coexist harmoniously on the site.

Port Activities, Including Commercial Navigation

The Proponent has identified two types of commercial navigation activities in the study area, namely the activities of the Port of Québec in the Beauport sector and the activities of the Ross-Gaudreault Cruise Terminal. The existing port facilities accommodate ships that link Québec City with the Great Lakes and the rest of the world. In 2019, 11 million tonnes of solid and liquid bulk cargo were transhipped in the Port of Québec's Beauport sector terminals (Englobe 2020i). For its part, the cruise terminal, which welcomes more than 30 large ships and 168,000 visitors each year, provides visibility and major economic spin-offs for the region.

The cruise terminal is used by more than 30 large ships and 168,000 visitors each year. According to the Port of Québec website (viewed on January 21, 2021), Québec City had more than 236,000 visitors in 2019. This popularity results in exceptional exposure for Québec City and major economic benefits for the region. According to the Port of Québec, Québec City store owners and hotel operators take in an average of $111 for each stopover passenger and $329 for each destination passenger. Tourisme Québec estimates the economic gains associated with the cruise industry in Quebec to be $85.9 million.[41]

[41] Port of Québec website: https://www.portquebec.ca/en/cruises/destination-quebec-3202aa9b-bc49-42e0-8178-56034f673c1d/vessel-schedules

Recreational and Commercial Fishing

There is recreational boat fishing in Beauport Bay from mid-May to mid-October. A storage and launching area is available to users. However, launching motorized craft (water-skiing, personal watercraft, motorboats) from the site is prohibited. According to the Proponent, recreational fishing in the expanded study area is concentrated at both ends of the St. Charles River estuary. This spring and summer activity is not very popular in the area. On the other hand, intensive sport fishing for walleye and sauger is carried out in the fall. With regard to commercial fishing, five licences were issued in 2016. Other fishers located downstream from the Project site may hold commercial fishing licences and may carry out this activity off the eastern tip of Île d'Orléans and on the south side of the channel. Lake sturgeon, Atlantic sturgeon, channel catfish, walleye, sauger and carp are the species that are fished commercially between the limits of Saint-Augustin-de-Desmaures and the eastern tip of Île d'Orléans. The Proponent notes that for the administrative region of the Capitale-Nationale du Québec, according to 2015 data from the Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques, the harvest quota for lake sturgeon in this region is 5.5 metric tons compared to 60 metric tons for the St. Lawrence Upper Estuary. The Proponent has indicated that the locations where fishing is carried out for this species in the study area are not near the Project area.

As described in Section 5.4 of this report, the Laurentia Project is located in rare and complex habitats that are particularly important for the reproduction, feeding and movements of several fish species including striped bass, lake sturgeon, Atlantic sturgeon, American smelt and American shad. These species make considerable migrations on both sides of the Beauport sector. Indeed, the St. Lawrence River has been described as a “crossroads of connectivity” for fish diversity along an approximately 350-kilometre stretch of the river between Beauharnois and the eastern tip of Île d'Orléans, a stretch that is essential for spawning and for the development of young life stages of a number of fish species (Mingelbier *et al*., 2016).

Lake sturgeon, Atlantic sturgeon, walleye and smelt are species that are valued and prized in the recreational, commercial and Indigenous fisheries along the St. Lawrence River (fishing zones 7, 8 and 21 of the Ministère des Forêt, de la Faune et des Parcs (MFFP)). In Quebec, as in the rest of Canada, recreational fishing has a significant economic footprint. In Quebec, in 2016, 5,077 jobs were created or maintained by fishing-related activities. In the year 2015, current spending (packages, transportation costs, food and lodging, fishing services, etc.) plus spending on durable goods (boats, special vehicles, fishing equipment, etc.) by recreational fishers generated an increase of $473 million in the province's gross domestic product (B.E.S.T.E., 2018). According to Mingelbier et al. (2016), approximately 10 percent of sport fishers in Quebec fish on the St. Lawrence River. Moreover, considering the diversity of fish species present and the proximity of major urban centres, sports fishing on the St. Lawrence River has a strong potential for further development (Mingelbier *et al*., 2016).

Sturgeon have supported a commercial fishery in the river for more than a century and are of great historical importance to Indigenous peoples. In the case of lake sturgeon, after more than three decades of decline (Mingelbier et al. 2016), an increase in the abundance of the species has been observed over the last decade throughout the St. Lawrence River as a result of the implementation of several management measures and the improvement of spawning habitats (Paradis *et al*., 2020).

In 2020, a total of 51 active licences and a total catch of 10,000 sturgeon were authorized by provincial authorities for the commercial fishery targeting this species. Although the St. Lawrence remains one of the few rivers in North America with a sufficiently healthy lake sturgeon population to support a commercial fishery, the species remains vulnerable owing to the specific characteristics of its life cycle, notably its delayed reproduction, with males reaching reproductive maturity between 8 and 20 years of age and females between 15 and 32 years of age[42].

With regard to the Atlantic sturgeon, which almost disappeared in 1970, the management programs put in place for the species currently allow for the issuance of 16 licences as part of a commercial fishery concentrated between the eastern tip of Île d'Orléans and Kamouraska. In 2019, 5,137 Atlantic sturgeon were caught, representing 85.6% of the allocated quota of 6,000 fish (MFFP, 2020). A recent review of the Atlantic sturgeon fishery in the St. Lawrence Estuary nevertheless concluded that the population is currently overexploited due to two factors: the increase in the authorized quota (number of fish) since 2002 and the shift in the fishery towards smaller Atlantic sturgeon compared to the average size recorded during 2005-2018. Signs of overexploitation thus include the change in the size structure of the stock and the presence of a greater proportion of small individuals in the population. Thus, although the fishers do not catch the entire allocated quota, these two factors would mean that the exploitation rate is slightly above a sustainable level (MFFP 2020).

Recreational and commercial fishing for striped bass, a species that disappeared from the St. Lawrence River in the 1960s and was reintroduced in 2002, is not authorized because of its endangered status under the *Species at Risk Act*. At the initiative of the MFFP, in collaboration with partners such as the Fédération québécoise des chasseurs et pêcheurs, the Fondation de la faune du Québec and the Fondation Hydro-Québec pour l'environnement[43], major investments have been made by the governments of Quebec and Canada since 2002 to reintroduce striped bass into the St. Lawrence River and eventually allow the resumption of sport fishing. The recovery strategy and the proposed action plan for striped bass (DFO, 2019) recall that a survey on the recreational striped bass fishery in the Gaspé Peninsula conducted in 2015 evaluated that, from the second year of existence of this new fishery, more than 7,300 fishing days were devoted to this species, representing economic benefits of at least $1 million. If the recovery of striped bass were to allow the return of a sport fishery in the St. Lawrence Estuary, certain regions could benefit from significant socio-economic benefits.

American shad is a species that is designated as vulnerable under the Quebec *Act respecting threatened or vulnerable species*. However, encouraging signs observed further to the implementation of recovery plans could lead to a review of its status in the coming years (Gagnon-Poiré *et al.,* 2020).

[42] https://mffp.gouv.qc.ca/faune/peche/poissons/esturgeon-jaune.jsp
[43] https://mffp.gouv.qc.ca/faune/habitats-fauniques/etudes-recherches/bar-raye.jsp

With regard to other activities related to the area and its resources, since the Project site is located in an urban industrial port sector, no hunting, trapping or gathering activities, and no seasonal camps or outfitting operations are authorized for non-Indigenous people within the Québec Port Authority's port territory (Englobe, 2018d).

5.8.2 Analysis of Potential Effects and Proposed Mitigation Measures

The effects on socio-economic conditions identified by the Proponent can be divided into two types: restricted access to waterways and the water body, and an increase in marine traffic which could cause disruptions to recreation and tourism activities, access to the St. Lawrence, and recreational and commercial fishing.

Project Effects on Recreational and Tourism Activities, River Access, Boating, and Commercial and Recreational Fishing During the Construction Phase

During the construction phase, the Proponent expects a loss of 0.5 hectares of the land currently used to store small boats in the Beauport Bay recreational and tourism sector. In addition, access to the southeastern part of the Beauport Bay beach would be blocked by temporary construction fencing, by the site preparation work, by the construction and installation of the retaining dike and the visual and acoustic screen, and by the relocation to the northwest of the floating dock (Englobe 2018d, pp. 10-52). Other effects could result from the construction of reinforced concrete caissons, the dredging and management of contaminated and non-contaminated sediments, the extension of access roads and the railway, machinery, and the presence of the wharf and the back-wharf. For example, the work could affect recreational and tourism activities (swimming, boating and birdwatching) and the safety of Beauport Bay users.

The Proponent states that the construction work would have the effect of restricting access to waterways and the water body for recreational and pleasure boating in the sector. Consequently, the floating dock in the beach sector would have to be relocated to allow boats to tie up a safe distance from the retaining dike. Birdwatching, a year-round activity in the Beauport Bay sector, could also be disrupted by the work. According to the Proponent, the presence of the concrete plant would not affect tourism in the St. Charles River estuary sector. In addition, the construction area would require navigation restrictions that could disrupt commercial and recreational fishing.

The Proponent proposes that a security perimeter around the construction site and traffic zones is marked off to ensure the safety of Beauport Bay boaters and users and to mitigate the effects of restricted access to waterways and the water body. In addition, a boat storage area would be set up near the Beauport Bay parking lots. The Proponent also states its intention to establish ongoing, effective communications with Beauport Bay users to them keep informed of operations and safety measures. Hence, with the mitigation measures to be taken by the Proponent, public access to the river would remain open during construction.

The RULV is concerned about Project start-up and construction, which would pose a significant threat to the continuity of activities in Beauport Bay. It is particularly concerned about the risk of disrupting activities or associated services. However, the Proponent stated that the current level of service (all uses: light sailing, windsurfing, kitesurfing, kayaking, rowing, canoeing, paddle-boarding, swimming, birdwatching, beach access, etc.) would be maintained for the normal activity period (May 15 to November 15). It also indicated that it would keep a boat storage area accessible during the work.

Project Effects on Recreational and Tourism Activities, River Access, Boating, and Commercial and Recreational Fishing During the Operational Phase

During the operational phase, the Proponent expects that the Project would have a minor impact on recreational and tourism activities, river access, and recreational and commercial fishing. In its view, the presence of the new port facilities and the screen would not hinder recreational and tourism activities in the study area, including those taking place in Lévis. No activity during the operational phase would impede access to the beach and the Beauport Bay recreational and tourism site. The Proponent would build an overpass over the railway tracks to provide continuous, safe access to boat-launching ramps and recreational areas. In addition, the visual and acoustic barrier proposed by the Proponent would increase the amount of recreational land by 0.4 hectares. Lastly, the essential character of the Estuary sector would be maintained during the operational phase, since no permanent structures would be built.

Concerns were also raised by members of the public about the Project's potential risk to the UNESCO World Heritage designation of the Historic District of Old Québec. They pointed out that the tourism industry is closely linked to that status, and they expressed concern about the Project's potential impacts on tourism and the associated workers and economy. The Organisme des bassins versants de la Capitale points out that Québec City is internationally recognized for its unique cultural and physical heritage and is a very popular tourist destination in North America. It is concerned about the introduction of new industrial infrastructure into the river landscape that could tarnish Québec City's attractive image. Démocratie Québec points out that a collective of 200 authors, artists and creators has emphasized the interdependence between Québec City's historic sites and the surrounding landscape. This collective notes the inspirational power of the river and Québec City's vast panoramas and is concerned about the effects that the Laurentia Project could have. Démocratie Québec also points out that Québec City is an extraordinary tourist destination and that this source of inspiration must not undergo as massive an alteration as the Project in its current form would entail.

The Ministère du Tourisme du Québec (MTQ) is of the opinion that the Project could have adverse effects on tourism due to the impact on the landscape. The new facilities would be visible from the Old Québec, Beauport Bay, Sainte-Pétronille and Lévis sectors and would change the view of Beauport and the mountains of the Laurentian Shield, including Mount Sainte-Anne in the background. Extension of the port facilities could also diminish Beauport Bay's recreational and tourist appeal. All of these factors could jeopardize Québec City's attractiveness as a tourist destination and eventually lead to a decrease in tourism and its economic benefits. The Project's potential effects on the physical and cultural heritage are discussed in Section 5.9.

Recreational and Tourism Activities and Swimming

The Proponent does not anticipate any major changes in swimming and recreational and tourism activities in Beauport Bay. However, the public and environmental and citizens groups are very concerned about the potential loss or modification of the space or some of its uses. A number of groups, including Accès Saint-Laurent Beauport, point out that the site is a federal legacy left to the residents of Québec City at the time of the city's 400th anniversary and want to ensure that the site is not mutilated and disfigured by the Project. Groups and individuals, including the Association québécoise des médecins pour l'environnement, point out that the expansion, the installation of the visual and acoustic screen, and the presence of the cranes and containers would afford users of the site a narrower, industrialized view instead of the current vast panoramic view of the river, the south shore and Old Québec. Some residents argued that the latter view adds value by creating a link between nature and the urban landscape of Québec City. In their opinion, a narrower, industrialized view, coupled with the increased noise nuisance and the degradation of air quality, would greatly diminish the attractiveness and popularity of this highly valued site. The Agency notes, however, that the Proponent hopes to carry out a Trame Verte project that would green part of the recreational and tourism site.

Individuals who submitted comments or participated in the consultations also expressed concern about whether swimming would still be possible, particularly because of dredging, sediment management, and changes in the river's currents and water quality. They are also worried that the erosion that is already occurring may be exacerbated by the presence of the new port facilities and may affect the future of the beach. However, the studies carried out by the Proponent regarding the Project's effects on the hydrosedimentary regime show that the currents near the bathing area would be slightly weaker than they are now and would not intensify the current erosion. This decrease would not pose any risks to the uses of Beauport Bay. The Proponent plans to collaborate with the Laval University Geography Department on a research project to describe possible modifications to the beach and the southwestern re-entrant (wetlands to the southwest of Beauport Bay) during the operational phase. The study may provide recommendations on the measures required in the event that effects are observed on the beach or the habitats of the southwestern re-entrant (Englobe 2020j).

Residents also raised concerns about the bacteriological quality of the water in the swimming area, which may be affected by the extension of Québec City's emergency outfall, required for the new terminal. Following studies modelling the behaviour of the effluent, the Proponent states that no effect is anticipated on the bacteriological quality of the swimming water. The Proponent is committed to monitoring the quality of the water for swimming and to providing Québec City with the information required to monitor it, if necessary (Englobe 2020q).

In the MELCC's view, uncertainties remain regarding the bacteriological quality of the water and the possibility of opening the beach to swimming, following completion of the Project. The MELCC points out that the predictive model used since 2016 to determine whether the beach can be opened for swimming includes variables such as rainfall, tide height, the presence of gulls and large birds, wind direction and the presence of storm sewer outfalls. All of these variables could be affected differently if currents in Beauport Bay are reduced following project completion. Diminished currents could, for example, favour bacteriological proliferation on the beach. The MELCC recommends that the predictive model that made it possible to reopen Beauport Bay Park beach to swimming be updated, which the Proponent has committed to doing.

Boating

Because of the anticipated effects in the Beauport Bay recreational sector and the high value placed on this site by users, the Proponent established the Forum des usagers de la Baie de Beauport (FUBB) in 2016 to discuss the Project's effects. Meetings gave users an opportunity to express their concerns and enabled the Proponent to adjust its Project. One of the outcomes of those meetings was the Proponent's decision to drop plans to expand the beach and install a breakwater as part of the Project. According to users, those two proposals would have put an end to boating on the Beauport Bay site. The RUVL and the AKVQ acknowledge the value of the FUBB, which helped establish a collaborative relationship between the Proponent and the various Beauport Bay user groups.

In particular, the FUBB helped the Proponent design a project to offset the loss of terrestrial space for users that takes their needs into account. According to the Proponent, the offset project would maintain, or even improve, certain facilities used by boaters and other users, notably the launching ramp and the boat storage area. The Project also incorporates users' safety concerns by moving the safety watch service to a location that would ensure good coverage of the boating area. Lastly, it allows for the continued use of the current launch area on the beach (Englobe 2020p).

With respect to recreational boating, the Proponent anticipates a decrease in the size of the recreational boating zone around the new structures to ensure boater safety. The Proponent also expects a slight decrease in recreational boating traffic in front of the future Pier 54. According to the Proponent, however, that area is mostly frequented by experienced users, who will be able to adjust their navigation route accordingly. Lastly, the Proponent expects that users will have to adjust their navigation route slightly when leaving Beauport Bay in order to bypass the retaining dike and the new wharf.

In contrast, the AKVQ and the RUVL are of the opinion that the planned encroachment into the river would cut off a large portion of the navigable area currently in use. According to the AKVQ, although the navigable area is fairly large, the part close to shore is the most heavily used part (safer).

With regard to changes in the wind regime and its effects on sailing activities, the Proponent conducted a modelling study of changes in wind patterns that takes into account the presence of the new facilities. The study includes the existing infrastructure and buildings, the new facilities, their height and their particular shapes. It also factors in the presence of a moored vessel to reflect the scenario that generates the most significant change in the wind regime. Two wind speed modelling scenarios were selected to test the Project's effects for beginners (winds of 4 m/s) and more experienced sailors (winds of 10 m/s). The Proponent's main conclusions are summarized in Table 16, which also presents the RUVL's and the AKVQ's interpretation of how the changes will affect their activities.

Environment and Climate Change Canada (ECCC) generally concurs with the findings of WSP's wind regime study (2020). However, the Department cannot corroborate the Proponent's findings (Englobe 2020p) regarding the significance of these changes for sailing activities in Beauport Bay since it lacks the necessary expertise. ECCC nevertheless believes that the Proponent could have further documented the changes in turbulence conditions that could be caused by the new facilities.

Table 15: Summary of the Proponent's findings (WSP, 2020) regarding the Project's effects on winds and recreational boating and the interpretations of and concerns raised by the RUVL and the AKVQ

Wind direction	Proponent's findings Effects on winds and turbulence	Proponent's findings Effects on boating	RUVL interpretations and concerns Effects on boating	AKVQ interpretations and concerns Effects on boating
ENE (27% of the time)	Boating area close to the beach • 5% to 10% increase in wind speed • Slight increase in turbulent kinetic energy (future turbulence conditions similar to current conditions in this sector) Boating area away from the beach • No impact East and south of the new terminal • No impact	• Negligible effects in the boating area (area northeast of the beach) • Slight increase in hours of sailing in a year: 4 to 8 hours for beginners; about 15 hours for experienced sailors • Near the beach, the available sailing area to the northeast is about 650 m and gradually widens out along the length of the facilities. At the end of the terminal, the width is about 900 m and then returns to its full width.	Little impact would be felt in the boating area. Some turbulence (gusts, swirls) is to be expected in the future terrestrial boat storage area. Measures to secure boats (special anchorages, wind deflectors) would be needed.	Effect on boating: No impact Effect on safety: • Higher risk of loss of kite control near the beach and the Projected enclosure area • Increased risk of collisions due to the concentration of boats confined to the remaining navigable area
WSW (37% of the time)	Boating area close to the beach • 10% to 50% local increase in wind speed due to slight displacement of the wind corridor • Slight increase in turbulent kinetic energy (future turbulence conditions similar to current conditions in this sector) Boating area away from the beach • No impact	Boating area east of the new terminal: • Decrease in hours. At 750 m from the end of the terminal, a decrease of about 100 hours (out of a total of about 200 hours). Boating area northeast of the beach: • Negligible impact	The Project structures could create significant wind turbulence in the boating area. That turbulence could create pockets where there would be no wind and corridors where the wind could accelerate by as much as 50%. The turbulence might be measurable more than 2,500 m from shore.	Effect on boating: Users confined to the northern part of the Bay, which is not navigable at low tide. Impossible to cross to Lévis. Effect on safety: • More difficulty or incapacity to sail upwind at low tide (confinement) and drift toward Île d'Orléans • Increased risk of collisions due to the concentration of boats confined to the remaining navigable area

Wind direction	Proponent's findings Effects on winds and turbulence	Proponent's findings Effects on boating	RUVL interpretations and concerns Effects on boating	AKVQ interpretations and concerns Effects on boating
	East and south of the new terminal • The potentially impacted area extends 2,500 m east of the new terminal, where speed reductions of more than 10% are observed • The speed reduction ranges up to 75% near the eastern end of the new terminal and up to 40% 750 m from the end	Boating area south of the beach: • The significant reduction in wind speed in the extension of the port facilities toward the ENE leads to a break further out from the boating corridor.		
WNW (12% of the time)	Boating area close to the beach • 25% local decrease in wind speed along the beach • Decrease in turbulent kinetic energy (future turbulence conditions similar to current conditions in this sector) Boating area away from the beach • No impact East and south of the new terminal • 25% to 75% decrease in speed to the south over a span of 1.5 km	• Decrease of 10-15 hours in periods of wind speed over 4 m/s • Decrease of 5 hours in periods of wind speed over 10 m/s • The area southeast of the new port facilities would be more affected over an area of 1,500 m for both wind speeds. This effect would be due to the obstruction caused by the new facilities at the level of the port – i.e., ships and containers – deflecting the air currents higher up.	For winds in the WNW sector, the Project's new structures will have significant impacts mainly in the boating area covering the St. Charles River estuary and out as far as the south shore of the St. Lawrence, near the ferry dock in Lévis. Once again, turbulence will be significant. This area is frequented somewhat less by Beauport Bay users (as it is out of the watch service's field of view), but it is very popular with keelboaters from Québec City marinas.	

On the basis of this study, the Proponent is of the opinion that sailing activities in Beauport Bay would not be disrupted by the presence of the new port facilities, which, according to the Proponent, would not significantly influence the winds. The Proponent bases its conclusions on the fact that users' preferred wind directions are west-northwest (WNW) and east-northeast (ENE) and the change in those winds would be negligible. The Proponent expects that the no-wind areas would be displaced slightly along the line of the new cranes, but that this displacement would only affect the navigation route bypassing the Project to the south, which would not be a preferred navigation route for beginners (Englobe 2020p).

According to the WSP report (2020), with WSW winds (prevailing winds 39% of the time during the sailing season), the height of the terminal equipment would have the most significant effects on sailing activities. Winds deflected upward by that equipment would only return to the water level after a long distance. That reduction in WSW wind speeds would shorten the sailing season. According to the report, it is estimated that at 750 m from the end of the terminal, there could be a decrease of about 100 hours for both wind speeds over the entire sailing season; under current conditions, sailing time totals about 200 hours (WSP June 2020).

However, the Proponent maintains, following meetings with the FUBB, that WSW winds are not sought after by users, as they are already affected by the port's existing buildings and other infrastructure (WSP 2020). In contrast, the AKVQ reiterates in its submission that WSW winds, even if disturbed, are sought after and important for windsurfers. In WSW winds, windsurfers sail further from the beach, where the interaction of WSW winds with buildings is less noticeable. The AKVQ also points out that there are more sailing days with WSW winds than with ENE winds.

The RUVL raises concerns about the increased turbulence that the new facilities might cause in winds coming from the west. That turbulence could have significant impacts on the quality of sailing and on user safety, particularly when boats are departing or arriving. The AKVQ disputes the Proponent's findings and is concerned about the Project's effects because of the loss of about 50% of the navigable area currently in use and changes in the wind regime (see Figure 11). According to the AKVQ, no offsetting measures could offset the permanent loss of the southern half of the water body due to backfilling of the river and wind reductions and disturbances. In its December 2020 submission, the AKVQ provided an illustration of its interpretation of the Laurentia Project's impact on the size of the boating area at high and low tide (Figure 11). According to the AKVQ, the current area (delimited by the red line) at high tide covers almost the entire body of water and presents no obstacles likely to affect boater safety or the watch service. When the Projected wharf (yellow line) and the WSW wind turbulence zone (blue line) are added, the AKVQ maintains that nearly half of the navigable water body is lost. Users may no longer be able to venture south of the new wharf and the turbulence zone for safety reasons. At low tide, the area is smaller. Currently, there is still room for boating while avoiding the tidal flats. According to the AKVQ, the body of water may become impassable at low tide if the Project is carried out. With the combination of low tide and the WSW wind turbulence corridor (in blue), the AKVQ argues that sailing in the area outlined in red would require technical manoeuvres that only seasoned experts could execute.

The AKVQ is also concerned about the safety of recreational boaters and other users of the site. The space lost to encroachment by the Project and the loss of navigable area due to changes in the wind regime could, in the AKVQ's opinion, concentrate boaters in a smaller area and create a bottleneck between various nautical

and aquatic uses, including light sailing and swimming. The Organisme des bassins versants de la Capitale points out that the navigable space could be reduced by the presence of large container ships, which have the right of way. The increased traffic density could heighten the risk of collisions and have a considerable ongoing effect on safety practices.

The Proponent,[44] in conjunction with the FUBB, made a commitment to deliver a development plan to mitigate the Project's impacts on the quality of the WSW winds and to improve the quality of the boating facilities (offset project). That Project would include the addition of a new harbour master's office and the spaces needed for a sailing school. The Proponent is also committed to marking off the sector to facilitate navigation, providing a map to guide users, and educating users. The Proponent is also committed to having the site manager (Gestev), in conjunction with the groups present on the site, provide training for users through courses offered by a sailing school. In the RUVL's view, this last commitment should also include investments to renew the fleet of boats and the other equipment needed to meet sailing standards and address the needs of various client groups, including children, families, competitive athletes and disabled persons.

[44]Port of Québec, news release dated June 18, 2020. About the Port - Media and Public Relations - News Releases - Port of Québec (portquebec.ca)

Figure 11: AKVQ interpretation of the Laurentia Project's impact on the size of the navigable area for small sailboats

Source: AKVQ submission, December 2020.

Recreational and Commercial Fishing

With respect to disruption of recreational and commercial fishing, the Proponent proposes to improve the quality and quantity of fishing areas in the sector under its jurisdiction. To that end, it will continue working with the Fédération québécoise des chasseurs et des pêcheurs (FédéCP). In its comments on the Agency's November 2020 preliminary report, the FédéCP confirms that discussions are continuing with the Proponent on the options for offsetting for spawning ground losses through the development of infrastructure aimed at improving river access. In addition, on the basis of the Proponent's studies and data and of accounts by fishers noting an increase in the numbers of striped bass in the river, the FédéCP concludes that the reintroduction program has been successful and that the St. Lawrence's striped bass population is in good health. In this regard, the FédéCP disagrees with the findings in the Agency's preliminary report regarding the Project's residual adverse effects on recreational fishing. According to the FédéCP, the Laurentia Project will be a driving force and a critical asset for the organization to be able to consider resuming fishing for striped bass in the St. Lawrence River and even to support sport fishing in the Québec City area (FédéCP).

The First Nations, meanwhile, expressed concern about fishing for migratory species (see Section 5.4). In addition, the Huron-Wendat Nation is concerned about the Project's potential impacts on its right to trade, such as restriction of access to the land or impacts on the quality and abundance of the resources in the St. Lawrence River.

Effects of Increased Vessel Traffic on Commercial and Recreational Boating

The transit of commercial ships to the Port of Québec and the Ross-Gaudreault Cruise Terminal, as well as recreational boating in the area, could be disrupted due to temporary restrictions caused by construction work. The Proponent used data (2012-2015) from the Canadian Coast Guard's Vessel Traffic Management Information System (VTMIS-INNAV) to assess the increase in marine traffic resulting from its Project in the study area. However, unlike the VTMIS data, which tracks round trips of vessels on the St. Lawrence, the traffic predictions provided by the Proponent reflect only the number of vessels expected to put into the port. Thus, according to these estimates, the Project would result in a maximum addition of 156 vessels (Englobe, 2020a) to the current amount of vessel traffic, which varies between 5,000 and 6,000 vessels annually.

The public and the Innu First Nations are concerned about the safety of small boats because of the type and size of vessels expected at the new terminal. The Innu First Nations point out that with its high deck loading, this type of vessel has a limited field of view for the pilot and a large blind zone at its bow and sides. Hence, the introduction of these large container ships could have consequences for boating in the Beauport sector and on downstream sectors. For the Innu First Nations, the increase in marine traffic is causing growing appropriation of the St. Lawrence River by merchant shipping. In their view, it is becoming less permissible to use the waterway for non-commercial purposes, in particular with smaller boats and affordable equipment. First Nations consulted are also concerned about the potential effects of increased shipping related to the Project on their fishing activities beyond the Proponent's area of jurisdiction. These effects are beyond the scope of this environmental assessment which is limited to the effects of the Project in the Proponent's area of jurisdiction. However, the Agency highlights the concerns raised by the Innu First Nation of Essipit, which maintains that, if the increase in navigation generates significant impacts on the ecosystem of the

St. Lawrence River, their economy which is dependent on recreation and tourism activities, as well as their traditional practices, could be severely impacted. Also, the Innu First Nation of Pessamit is of the opinion that an increase in vessel traffic could have adverse effects on their economic activities related to harvesting of crab, sea urchin, salmon and groundfish in the St. Lawrence Estuary. The Abenaki of Wôlinak and Odanak expressed concerns about the increase in marine traffic in the Lake St. Pierre sector. Similarly, the Mohawks consider that the Project could have impacts on the territory of Kahnawà:ke, due to the potential increase in Seaway traffic in the caused by the Laurentia Project and changes to the ecosystem. The effects of the Project on the use of Indigenous lands and resources and the impact on Indigenous and treaty rights are discussed in Section 5.9 and in Chapter 7.

As mitigation measures for the increase in marine traffic, the Proponent has proposed the use of available navigational aid programs, such as radars and visual and audible signals, in order to increase navigational safety, in consultation with Baie de Beauport users. According to the Proponent, aids to navigation must be used to ensure safe navigation and manoeuvrability for commercial ships, both around the containment dike and in the waterway, as well as for users in recreational boating zones.

5.8.3 Agency Analysis and Conclusions on Residual Effects

Effects Analysis

Recreational and Tourism Activities, River Access and Boating

The Agency notes that during construction, the Project may have an impact on recreational and tourism activities, river access and boating. However, the Proponent made a commitment to maintain the current level of service (all uses: light sailing, windsurfing, kitesurfing, kayaking, rowing, canoeing, paddle-boarding, swimming, birdwatching, beach access, etc.) for the normal activity period (May 15 to November 15) during construction. The Beauport Bay recreation and tourism site is likely to be the area most affected by the presence of the construction site (noise, truck traffic, dust and other disturbances). The number of visitors to the site could decrease, in part because of the concerns that some users might have about the presence of a major construction site.

Furthermore, the restricted zone that would be put in place by the Proponent in the boating area and the presence of the construction site may have adverse effects on the site's use for boating or sailing. The Agency notes, however, that the Proponent would take measures to reduce the construction site's effects on users, including the maintenance of a storage area for small boats. It is also important to note that the construction phase is limited in time.

The Agency shares the concerns of the public and the Ministère du Tourisme du Québec about the impact that the Project could have during the operational phase on Québec City scenery and tourism. Although the Project is part of an already industrialized landscape, the artificialization of the shoreline and part of the river would affect the natural and historical character of Québec City's landscape and surroundings.

In the Agency's judgment, the Project could have adverse effects on recreational and tourism activities and swimming in Beauport Bay. The narrowing of the view of the river, noise pollution, and the industrialization of the site and the landscape would permanently change the area's sweeping natural ambiance. The Agency is of the opinion that the Project could make the site and its assets less attractive, but that its use would not be compromised. The Association québécoise des médecins pour l'environnement points out that the site is close to and used by a population group that has social, economic environmental and health disadvantages. The location benefits this group and provides access to nature in the heart of the city. It should be noted, however, that the greening of the site by the Trame Verte project proposed by the Proponent could partially reduce those effects.

As for the beach-related activities, the Agency is of the view that morpho-sedimentological follow-up and the Proponent's commitments to revise the predictive swimming water quality model satisfy the requirements to ensure the sustainability of the site's use.

On the basis of the WSP study (2020) and the concerns raised by the RUVL and the AKVQ, the Agency is of the opinion that recreational boating and sailing sports could be adversely affected. The Project's encroachment on a currently used boating area and the new facilities' effects on the wind regime would reduce the size of the boating area, particularly when the prevailing winds are from the WSW. This reduction in the boating area could have an impact on the safety of Beauport Bay users and change the conditions for sailing and other non-motorized boating. The reduction in available boating space could force users to cross paths more frequently at shorter distances. The Project's effects on wind conditions could also make it more complicated to engage in such activities by generating hazardous situations and risks of collision.

In the Agency's view, a number of uncertainties remain regarding the significance of the Project's impact on recreational boating and sailing sports. Various environmental and social factors are involved, making it difficult to determine what effects the Project will actually have on the future of those sports at the Beauport Bay site. The Agency notes that this is a suitable learning site for all sailing sports and that such sites are rare in the Québec City region. The Agency is also of the opinion that the introduction of tall structures and their effects on winds may make the site less favourable for learning boating skills, although more experienced boaters will probably be able to continue using the site.

Nevertheless, the Agency finds that the key measures detailed below would ensure that sailing and board-based sports (windsurfing or kitesurfing) would remain safe. The facilities that will be added will help maintain and, in some cases, improve the range of services available. Follow-up to determine the Project's actual effects on the wind regime may help users adjust the way they practise their sports and better understand the new characteristics of the navigable area. The Agency nevertheless recognizes that the reduction of the navigable area and the effect of concentrating users in a smaller area could cause some users to stop frequenting the site. Hence, the Project would lead to changes in the behaviours necessary for engaging in boating and sailing activities, particularly for less experienced users, but the activities could still be carried on.

Lastly, near the new Pier 54, Transport Canada recommends restrictions on non-commercial marine traffic during loading and unloading operations in order to avoid accidents. Boaters who travel close to the wharves will have to change their routes during those operations. In the Agency's judgment, the measures identified in Section 6.1, Accidents and Malfunctions, though they limit the area accessible to recreational boaters when ships are at the wharves, would reduce some of the safety risks to Beauport Bay users.

Recreational and Commercial Fisheries

The Agency relies on the advice from Fisheries and Oceans Canada to concludes that adverse effects and uncertainties related to fish and fish habitat could have significant impacts on recreational and/or commercial fishing for species such as lake sturgeon, Atlantic sturgeon, American shad as well as on the potential resumption of fishing for striped bass. However, the effects on the fishing activities targeting other valued species such as sauger and walleye would not be significant and could be offset.

Fisheries and Oceans Canada considers that the Project would have significant effects on habitat used for reproduction, rearing, feeding and migration by a number of fish species including striped bass, lake sturgeons, Atlantic sturgeon, American shad and American smelt. Based on current knowledge, Fisheries and Oceans Canada is of the opinion that the effects on certain habitats cannot be offset (see Section 5.4). The Agency thus considers that the adverse effects on the distribution and abundance of these migratory species could be felt in the recreational and commercial fisheries in the St. Lawrence River. In the Agency's view, the apparent recovery of striped bass and the potential existence of other spawning sites for this species are not admissible arguments to justify destroying one of the only two spawning grounds recognized as contributing to the recruitment of the species' population. In general, loss or modification of the habitat of a recovering species could have an impact on the distribution and abundance of the species and thus affect recreational and commercial fishing.

Taking into account these potential effects, that it is impossible to offset for certain habitats and very difficult to offset for other, particularly sturgeon, the Agency considers that the Project could lead to changes in recreational and commercial fishing activities. For example, the overall performance of the recreational fisheries in the river, which can be considered highly lucrative recreational activities in Quebec (Mingelbier *et al.* 2016), could be affected by a decrease or changes in stocks of certain fish species. These changes would force fishermen to switch to fishing for other species or to move to other locations to continue fishing for valued species.

Fisheries and Oceans Canada has highlighted the socio-economic importance of fish and fish habitat in the Project area. As well, the investments made by governments in reintroduction, recovery and monitoring programs for migratory species could potentially allow the reopening of recreational and commercial fisheries for species such as striped bass and the conservation and expansion of one of the only remaining Atlantic sturgeon fisheries in the world. In the Agency's view, this is a small increase and, with the mitigation measures proposed by the Proponent, it would not significantly disrupt recreational and tourism activities in the sector.

However, the Agency is of the opinion that the type and size of the container vessels expected at the new terminal could heighten the risks for small craft. The Agency shares the Innu First Nations' concerns about introducing these new types of vessels. The blind zones created by high deck loading limit pilots' field of view. However, the ships will be moving at low speeds near the terminal, which would allow small boats to modify their routes to avoid them. The Agency also believes that the mitigation measures described below would reduce the safety risks arising from the coexistence of large ships and recreational boats.

Intensification of Marine Traffic on Commercial and Recreational Vessels

The Agency notes that the Project sector is characterized by port infrastructure and that Baie de Beauport users already coexist with the ships that transit in the area. According to the data presented above for marine traffic, between 2012 and 2015, more than 5,000 ship movements took place annually, on average, on the St. Lawrence River near Québec City. Bulk carriers, which are ships carrying bulk solids, accounted for half of the movements on the St. Lawrence River during the period concerned. Container ships, for their part, represent approximately 16% of the movements on the river. The Project would add approximately 156 additional ships, a figure that would be less than the average variation in annual marine traffic in the sector.

The Agency considers that this increase is small and that, taking into account the mitigation measures proposed by the Proponent, it would not significantly disrupt recreation and tourism activities in the sector. However, according to the Agency, the mitigation measures described below would have to be implemented to avoid disruptions to commercial navigation and recreation and tourism activities in the sector, as well as to avoid the safety risks associated with the coexistence of large vessels with swimming and boating activities.

Agency's Conclusion

Following its analysis and based on the assessment criteria presented in Appendix A, the Agency concludes that the Project is likely to cause significant adverse environmental effects on socio-economic conditions and more specifically those related to the recreational and commercial fishing for lake sturgeon, Atlantic sturgeon, American shad as well as on the potential resumption of fishing for striped bass (Appendix B).

The Agency concludes that the significance of these effects would be high for the following reasons:

- The intensity of the effects on socio-economic conditions would be high because of the adverse effects on fish and fish habitat, which could cause changes in the distribution and abundance of valued fish species and thus impact recreational and commercial fishing;
- The Project would result in effects that are regional in extent and long term in duration since many of the fish species that would be affected by the Project are part of migratory populations that have a regional geographic distribution and that travel great distances, thus affecting recreational and commercial fisheries throughout the St. Lawrence River (350 kilometres approximately). The effects would be felt over the long term since many habitats would be permanently lost and no measures (avoidance, mitigation or offset) could be put in place to significantly reduce these effects;

- The effects would be felt over the long term since the facilities are permanent and their effects on fish and fish habitat may persist over time. Multiple habitats would be permanently lost, and no measures (avoidance, mitigation or offsetting) could be put in place to significantly reduce those effects. The effects on recreational and commercial fishing may therefore persist over time;
- Changes to the environment that could result in effects on the commercial and recreational fisheries would be continuous during the operations phase, and would be irreversible.

Identification of Key Mitigation Measures

The Agency has identified the main mitigation measures likely to mitigate several potential effects of the Project on economic conditions related to recreation and more specifically to ensure the sustainability of the sports of light sailing, windsurfing and kitesurfing. However, all of these measures, including those intended for fish and fish habitat (Section 5.4), would not sufficiently mitigate the potential effects of the Project to the point that the residual effects on recreational and commercial fishing would be non-significant. The Agency took into account the mitigation measures proposed by the Proponent, the advices of government authorities, and the comments received from First Nations consulted and the general public. These measures are as follows:

- Implement measures to support the continued recreational and tourism use of the Beauport Bay area. The Proponent shall:
  - During construction, develop, maintain and keep accessible a temporary storage area for recreational boats capable of accommodating at least the same number of boats as the existing storage area;
  - During the operational phase, develop, maintain and keep accessible a temporary storage area for recreational boats capable of accommodating at least the same number of boats as the existing storage area and protecting the boats from damage due to high winds;
  - During the operational phase, develop, maintain and keep accessible a boat-launch ramp and floating docks;
  - Mark off an access area on the beach for the launching of small craft;
  - Permanently relocate the watch service and, prior to relocation, implement temporary measures to meet site safety requirements during construction.
- Maintain continuous, safe public access to the Beauport Bay recreation and tourism site during the construction and operational phases while improving existing access roads, notably by building an overpass over the railway tracks.
- Maintain the Forum des usagers de la Baie de Beauport (FUBB) or any other equivalent group during the construction and operational phases to promote dialogue and discussion on issues related to the recreational and tourism character of the Beauport Bay site and the activities carried on there. In consultation with the FUBB, determine meeting needs and frequency.
- During construction, define and maintain a safety perimeter around the aquatic and terrestrial work sites in consultation with potentially affected parties.

- Prior to construction, update the navigational rules to be followed by recreational boaters and commercial ships docking at the Port of Québec and the Ross-Gaudreault Cruise Terminal during construction and operation to reflect the Project.
- In consultation with the potentially affected parties and the First Nations consulted for the Project, develop a communication plan to disseminate information such as the following:
  - the location and size of permanent and temporary works related to any dredging required for the Project, including aquatic and terrestrial disposal sites, and the type, volume and level of contamination of sediments to be dredged;
  - during construction, the anticipated start and end dates (month and year) and schedules of activities associated with the installation of the retaining dike, backfilling of the back-wharf and the installation of the visual and acoustic screen, and any other activities associated with the Project that requires temporary access restrictions, particularly for the Beauport Bay recreational and tourism area;
  - during the operational phase, the ship arrival, departure and mooring schedule and the ship loading and unloading schedule, including the posting of schedules near the boat-launch ramp;
  - any navigation restrictions, measures or aids;
  - the quality of swimming water in Beauport Bay;
  - any other information relevant to Beauport Bay users and boaters, the First Nations concerned and any other party involved in or affected by the Project.
- During the operational phase, mark off and maintain an area in which recreational and tourism activities are prohibited during ship loading and/or unloading to ensure the safety of Beauport Bay users and the activities taking place there.
- During the construction and operational phases, consult with potentially affected parties and provide navigational aids to mitigate the adverse environmental effects that the Project has on recreational boating, including:
  - installing and maintaining anemometers to continuously measure wind speeds at sites associated with boating from Beauport Bay and disseminating the information to boaters;
  - installing and maintaining beacons to mark rocks in the southwestern re-entrant;
  - developing and maintaining a map of the Beauport Bay boating area to inform boaters of boating conditions.
- In consultation with the Fédération québécoise des chasseurs et des pêcheurs (FédéCP), establish zones under the Proponent's jurisdiction that will serve to improve the quality and quantity of fishing areas in the Port of Québec sector.
- Revise the predictive swimming water quality model and provide all relevant information to Québec City for monitoring the quality of swimming water.

Need for Follow-up and Follow-up Requirements

Under the *Canadian Environmental Assessment Act, 2012* (CEAA 2012), a follow-up program verifies the accuracy of a project's environmental assessment and determines the effectiveness of the measures taken to mitigate the adverse environmental effects. The Agency therefore recommends the follow-up program below.

- Prior to construction, the Proponent shall develop, in consultation with potentially affected parties, a follow-up program to verify the accuracy of the environmental assessment and to determine the effectiveness of the measures taken to mitigate the Project's impact on light sailing, windsurfing and kitesurfing in the boating area marked on Englobe's Map 17-2 (2020p). The follow-up program shall include the following:
  - determining and describing the Project's actual effects on the wind regime (including wind speed wind taking into account their direction and turbulence conditions);
  - determining and describing changes due to the presence of the new container terminal (including encroachment on the site by the Project and changes in the wind regime) in the use of the boating area and the terrestrial area for light sailing, windsurfing and kitesurfing;
  - carrying out a follow-up in Years 1, 3 and 5 of operation and make the reports available to potentially affected parties;
  - in consultation with potentially affected parties, proposing adaptive measures such as mitigation or offsetting measures to reduce impacts.
- To verify the accuracy of the environmental assessment concerning the evolution of beach erosion and the displacement of the sand spit in the southwestern re-entrant, the Agency is of the opinion that the morpho-sedimentological follow-up specified in Section 5.3 will provide follow-up.
  - Following analysis of the results, in consultation with Environment and Climate Change Canada, the Ministère de l'Environnement et de la Lutte contre les changements climatiques, and the managers and users of the recreation and tourism site, determine the actions required to maintain the beach while ensuring that the surrounding biological environments – specifically, the wetlands of the southwestern re-entrant – are not damaged.
- Follow-up programs appropriate to the socio-economic context have been identified for other valued components analyzed in this report. In particular, see the Sections on fish (5.4) and human health (5.7).

5.9 Indigenous Peoples – Current Use of Lands and Resources for Traditional Purposes

The Agency is of the view that the Project would cause significant adverse residual environmental effects on the current use of lands and resources for traditional purposes, and, more specifically on the fishing activities practised by the Huron-Wendat Nation, the W8banaki Nation, the Essipit, Pekuakamiulnuatsh and Pessamit First Nations, the Kahnawà:ke Mohawk First Nation, and the Wolastoqiyik (Maliseet) Wahsipekuk

First Nation. Considering that the Project could affect the populations of several fish species already at risk (see Section 5.4) and of interest to these First Nations, the Agency considers that the fishing of lake sturgeon, Atlantic sturgeon, striped bass and American shad could be compromised by the Project.

Concerning the Mohawk First Nations of Akwesasne and Kanesatake, it was not possible for either the Proponent or the Agency to obtain information concerning the uses and rights exercised by their members. However, it is reasonable to believe that they also fish for migratory species and that, consequently, the effects on their use would be the same as for the Kahnawà:ke First Nation.

The following subsections present the information that the Agency considered in its analysis to conclude on the significance of the effects of the Project on the traditional uses of lands and resources. These sections also include the advice of expert departments, First Nations consulted and the general public.

5.9.1 Description of the Component "Current Use of Lands and Resources for Traditional Purposes"

For the purpose of federal environmental assessments, "current use of land and resources for traditional purposes" refers to any practice or activity that is part of the Aboriginal group's distinctive culture and that has been routinely practised by the Aboriginal group within a timeframe extending from recent past to present. The timeframe is established on a case-by-case basis depending on the specific activity or practice.. This may include activities such as hunting, fishing, trapping, and cultural or traditional uses of the land such as gathering medicinal plants or using sacred sites. The Agency also considers uses that may have ceased due to external factors if they can be reasonably expected to resume once conditions are restored. The criteria used by the Agency to assess environmental effects and the grid for determining their significance are presented in Appendix A.

In order to be able to determine the adverse effects on the current use of lands and resources for traditional purposes, the Agency examines, among other things, whether the Project could result in changes to the resources used for traditional purposes as well as changes in the conditions under which Indigenous peoples practise these activities and use the territory.

As part of its analysis, the Agency assessed the residual adverse environmental effects of the Project on the current use of lands and resources for traditional purposes by the Huron-Wendat Nation, the W8banaki Nation (Odanak and Wôlinak communities), the Essipit, Pekuakamiulnuatsh and Pessamit First Nations, the Kahnawà:ke, Kanesatake and Akwesasne Mohawk First Nation, and the Wolastoqiyik (Maliseet) Wahsipekuk First Nation. The study area selected by the Proponent to assess the effects on the current use of lands and resources for traditional purposes is the extended study area (Figure 3, Chapter 1). However, the Agency indicates that many of the resources hunted or fished by these First Nations travel long distances. Thus, the adverse effects on these resources may also be felt by First Nations who practise hunting or fishing outside of the expanded study area.

This section does not provide an exhaustive portrait of First Nations use, which is dynamix and fluctuates over time. The description below must be considered in the specific context of the Laurentia Project evaluation.

Description of Uses Practised by the Huron-Wendat Nation

To describe the Huron-Wendat Nation's uses, the Proponent referred to documents, studies and surveys provided, as well as to discussions with representatives from the Nionwentsïo Office[45]. The Project is located on the Nation's traditional territory and, according to a contemporary land-use survey conducted in 2016 by the Huron-Wendat Nation, 11 sites were identified as being used for traditional activities, including fishing, migratory bird hunting and other recreational activities (boating, hiking, etc.) (Englobe, 2018b). Of these 11 sites, six fishing sites, which could be affected by the decline in fish populations, are located between the Pierre-Laporte Bridge and the mouth of the Montmorency River, two of which are located within the extended study area. According to the Proponent, the main species of fish caught by the Huron-Wendat Nation are bass, striped bass, brown bullhead, channel catfish, pike, walleye, sturgeon, brook trout and Atlantic salmon. The Proponent reports that, according to representatives from the Nionwentsïo Office, the Huron-Wendat depend, in part, on fishing in the extended study area for their traditional food, particularly walleye, sturgeon and pike (Englobe, 2018b).

According to the Proponent, members of the Huron-Wendat Nation also hunt migratory birds in and near the extended study area. Those interviewed by the Huron-Wendat Nation Council as part of its 2016 complementary impact statement (HWNC, 2016) reported hunting snow geese, Canada geese and various duck species. The complementary study also identified five migratory bird hunting sites in the vicinity of the Project, including one located in Baie de Beauport.

According to the Huron-Wendat Nation survey, other documented uses in the extended study area fall under the general category of recreational activities (Englobe, 2018b). The survey revealed that some members regularly engage in motorized boating on the St. Lawrence River. One member mentioned making regular trips from the Lévis marina on different routes between Québec City and Montréal. Some members reported the occasional use of small boats, particularly in Baie de Beauport. Navigation is practised from May to October (Englobe, 2018b). In addition, recreational and family activities in Baie de Beauport were reported by several Wendake residents.

The Huron-Wendat Nation also reported the importance of its relationship with nature, its territory and the resources found there, which perpetuated as a result of the practice of traditional activity. The Nation's customs are an integral part of every aspect of Huron-Wendat life[46].

[45] "Nionwentsïo" means "our magnificent territory" in the Huron-Wendat language. The Nionwentsïo Office is a sector of the Huron-Wendat Nation Council, which is also in charge of protecting the territory.

[46] Consultation sur l'étude Étude d'impact environnemental du projet d'aménagement d'un quai en eau profonde dans le port de Québec – Beauport 2020, Conseil de la Nation Huronne-Wendat, March 3, 2017 (Brief).

Description of Uses Practised by the W8banaki Nation

The Proponent's description of contemporary uses of the W8banakiak (Abenaki) territory is based on existing data that remains partial since the Ndakina Office[47] has only been in place since 2013 (Englobe, 2018b). According to the Proponent, W8banakiak practice hunting, fishing, trapping and plant gathering activities. According to the Proponent and following consultations with the Ndakina Office, members of the W8banaki Nation do not make any particular use of the Project's extended study area for the practice of traditional activities (Englobe, 2018b). However, some members of the W8banaki Nation do navigate the extended study area for recreational purposes and as a traditional activity (Englobe, 2018b). The W8banakiNation reported that in order to access fishery resources and sites of knowledge transfer, they use boats, canoes and motorized rowboats, and access rivers through public and private ramps (Englobe, 2020f).

Fishing in the St. Lawrence River takes place mainly between Montréal and Sorel Islands, but extends to the Québec City area (Englobe, 2020f). The species fished by the Nation include, but are not limited to, yellow perch, shad, channel catfish and various species of walleye, sturgeon and catfish. The sturgeon is a species of cultural importance to the W8banakiak of Odanak. It is also the emblem of Odanak. The striped bass is also a valued species whose historic fishing was interrupted due to the species' extinction. Recovery of this species in the St. Lawrence River, in which the W8banakiak participate through research projects, would allow them to catch this species again. Migratory fish species, such as lake and Atlantic sturgeon, are caught year-round in open water or on the ice (Englobe, 2018b). With regard to sturgeon, W8banakiak informed the Agency that in addition to the monitoring and protection projects carried out by their Nation, they have also adopted quotas for the protection of the species, and the daily catch limit is set at one. Some members have also stopped fishing them.

The Proponent reports that the First Nation considers fishing to be central to the establishment of the individual and collective identity of its members (Englobe, 2019f). It is an integral part of their way of life and their diet, and is essential to the intergenerational transfer of W8banaki values and knowledge since it is often practised in the family, with the children. Fishery products are also subject to community sharing. It is also considered important for the physical, mental and spiritual well-being of W8banakiak (Englobe, 2020f). The Ndakina office also mentioned that W8banakiak women fish a lot, in equal proportion to men. This is because fishing is an activity that is easier to practise with children near communities. Women therefore play an important role in knowledge transfer. According to the Ndakina office, this implies that the effects on fishing would have a greater effect on women for whom it would be more difficult to travel to remote territories or to leave for longer stays to access the resource if it becomes necessary.

[47] "Ndakina" means "Our land" in Aln8ba8dwaw8gan (W8banaki language). The Ndakina Office is a sector of the Grand Conseil de la Nation Waban-Aki, which is in charge of responding to territorial consultations.

According to the Proponent, W8banakiak do not hunt migratory birds in the Project's extended study area. This type of hunting is mainly practised in the vicinity of Lake Saint-Pierre. It is also practised on the southern tip of Île d'Orléans and in the intertidal zone and tidelands of the south shore of the river near Montmagny. The species hunted are Canada geese, snow geese and several duck species (Englobe, 2018b).

Description of Uses Practised by the Kahnawà:ke, Kanesatake and Akwesasne Mohawk First Nations

The information used by the Proponent to describe the uses of the Kahnawà:ke, Kanesatake and Akwesasne Mohawk First Nations comes mostly from publicly available resources. A meeting held in 2015 with representatives from the Kahnawà:ke Mohawk First Nation provided additional information for this community (Englobe, 2018b). However, both the Proponent and the Agency were unable to obtain information regarding traditional uses by members of the Kanesatake and Akwesasne First Nations.

According to the Proponent, members of the Kahnawà:ke, Kanesatake and Akwesasne Mohawk First Nations do not practise any traditional, recreational or commercial activities in the extended study area. Members of the Kahnawà:ke First Nation in the Montréal area catch certain species of migratory fish such as lake sturgeon and American shad, whose distribution range includes the fluvial and estuarine portion of the river. The First Nation also hopes to be able to fish striped bass again when conditions are again favourable. The Agency has also received additional information from the Mohawk Council of Kahnawà:ke [48] that the Project could affect the availability of lake sturgeon, a species of cultural importance to the Mohawks, and of American shad at the members' practice sites, and thus have an effect on the Nation's food security. The Mohawk Council of Kahnawà:ke also highlighted the link between fishing and the experience surrounding this practice both in terms of community sharing and intergenerational knowledge transfer. The Mohawk Council of Kahnawà:ke established that there is a direct link between the usage effects of the Project and the repercussions it could have on the First Nation's culture and language.

Description of Uses Practised by the Essipit, Pessamit and Pekuakamiulnuatsh Innu First Nations

According to the 2004 Agreement-in-Principle of General Nature [49], the respective traditional territories (Nitassinan) of the Essipit, Pessamit and Pekuakamiulnuatsh First Nations are not included in the Project's extended study area. However, it does overlap with a customary territory used by the three communities called "Southwestern Part" corresponding approximately to the Capitale-Nationale du Québec region.

[48] Mohawk Council of Kahnawà:ke Briefs, 2017 and 2019

[49] https://www.rcaanc-cirnac.gc.ca/DAM/DAM-INTER-HQ/STAGING/texte-text/mamu_1100100031952_eng.pdf

According to the Proponent, some members of the Innu practice fishing in the Capitale-Nationale du Québec region, including in the extended study area and the surrounding area. Members of the Essipit Innu First Nation fish walleye at the Saint-André wharf in Québec City for four to five days a year. This information was collected by the Essipit Innu First Nation as part of the monitoring of its members' traditional practices (Innu-Aitum monitoring). However, since not all members have been met with yet, the data is not exhaustive. Contemporary use of the traditional territory of the Pekuakamiulnuatsh does not affect the extended study area or the St. Lawrence River. The traditional activities practised near the study area are fishing on the Montmorency River, upstream from the falls (Pekuakamiulnatsh Takuhikan and CPNIE, 2016). The members of the Pessamit First Nation practise their traditional activities mainly in the St. Lawrence River, downstream from the Project's extended study area.

Members of the three communities downstream from the extended study area fish for species such as Atlantic sturgeon and smelt whose population distribution includes the Québec City region. No other resource harvesting activities (including migratory bird hunting), hunting camps, or drinking water sources have been identified in the Project's extended study area (Englobe, 2018b). Migratory bird hunting is practised by some members outside the extended study area, but close to its boundaries.

The Proponent specified that certain members of the Essipit community supplement their diet with fish products. About 20 community members also practise subsistence fishing for redistribution to families (Englobe, 2020f).

Description of Uses Practised by the Wolastoqiyik (Maliseet) Wahsipekuk First Nation

The Proponent relied on public information available at the time of the environmental assessment to describe the uses of the Wolastoqiyik (Maliseet) Wahsipekuk First Nation. The Wolastoqiyik Wahsipekuk First Nation territory overlaps the southern portion of the Project's extended study area, on the south shore of the St. Lawrence River between the Chaudière River near Lévis and the Mitis River near Mont-Joli (Englobe, 2018b). According to the Proponent, there is little documentation about this nation's land use. However, during a meeting with the Agency[50], the Wolastoqiyik Wahsipekuk First Nation indicated that the Etchemin and Chaudière rivers, whose watersheds flow into the St. Lawrence River, are important for the practice of ancestral fishing, including catching lake sturgeon. The First Nation also informed the Agency[51] that they were in the process of documenting its members' uses and that they suspect they use the extended study area since several members live in and visit that area, and that its historical use by the Maliseet is documented. According to the Proponent, fishing and hunting for food purposes are still an integral part of the lives of many Maliseet families. The community also practises community hunting and fishing (Englobe, 2018b).

[50] Meeting between the Agency and the Wolastoqiyik Wahsipekuk Nation on the Project update and presentation of the Agency's new rights impact assessment methodology (January 15, 2019).

[51] Meeting between the Agency and the Wolastoqiyik Wahsipekuk Nation on the rights impact assessment (September 23, 2020).

5.9.2 Analysis of Potential Effects and Proposed Mitigation Measures

According to the Proponent, the disturbance and noise caused by the construction work could impact fishing, hunting and other activities practised near the construction zone. Access to the territory through entry points located in the extended study area could also be modified by the construction work.

The Proponent considers that terminal and port operations could also disrupt or alter activities related to the day-to-day use of land and resources. The effects would not be the same for all First Nations affected by the Project. The level of impact would depend on the type of activities carried out and their location (Englobe, 2020f).

Fishing and Hunting Activities

During the construction phase, fishing and hunting activities practised in the extended study area by First Nations members, including members of the Huron-Wendat Nation and Innu First Nations, could be disrupted by the construction work (disturbance and noise). According to the Proponent, fishing would be affected in an intermittent manner on both shores of the St. Lawrence, while hunting would be affected during the hours when construction work would take place because birds could leave the construction site area. However, bird distribution and abundance would not be altered (Englobe, 2020f).

For the Huron-Wendat First Nation, the Proponent anticipates that both fishing sites located within Baie de Beauport as well as the migratory bird hunting site on the shores of Baie de Beauport to be disturbed, particularly by noise from the construction work. For safety reasons, Huron-Wendat fishermen would not be able to access the fishing area partially located within the construction zone (Englobe, 2020f).

The Huron-Wendat Nation is concerned about the effects of the Project on game birds that could be disturbed during the construction phase and abandon sites near the Project. Hunters using these sites should therefore find other places to hunt. The Innu First Nations, for their part, are concerned about competition on more remote migratory bird hunting sites, which could increase due to the displacement of hunters currently using sites near the Project. These concerns were also raised for the operational phase.

According to the Proponent, noise from port activities and increased marine traffic during operations could indeed diminish the quality of the experience and disrupt First Nations' hunting and fishing activities. The Huron-Wendat Nation anticipates that it could be impossible for its members to carry out their activities in complete tranquility. However, access to the sites will not be modified. The Project would encroach on only a small portion of one of the fishing sites used by the Huron-Wendat First Nation.

The Proponent does not anticipate any significant effects on fish distribution and abundance in the river, including widely distributed migratory species such as striped bass, lake sturgeon, Atlantic sturgeon and American shad. The Proponent concluded that there would not be measurable effects on American shad fishery, that effects for the fishery of the two sturgeon species would be unnoticeable or marginal, and that

the Project would not affect the growth of the striped bass population and the eventual opening of a subsistence fishing (Englobe, 2020f).

However, as noted in Section 5.4: “Fish and Fish Habitat, Including Invertebrates”, the Agency concluded that there would be significant effects on fish and fish habitat, including migratory species such as striped bass, lake sturgeon, Atlantic sturgeon and American shad. Considering that these species migrate considerably on either side of the Beauport sector, that it is not possible to offset for certain habitats affected by the Project and very difficult to offset for others, effects on traditional or contemporary indigenous fishing activities could be observed. All the above-mentioned species are fished or involved in traditional activities by one of the First Nations targeted by the Project’s environmental analysis. Members of the Huron-Wendat, W8banaki, Innu, Kahnawà:ke Mohawk and Wolastoqiyik Wahsipekuk Nations could be affected by a decline in the numbers of any of the species affected by the Project. Concerning the Kanesatake and Akwesasne Mohwaks First Nations, as previously mentioned, it was not possible to obtain information concerning their uses. However, it is reasonable to believe that these two First Nations fish migratory species and that, consequently, the repercussions on fishing would be the same for these two communities as for the Kahnawà:ke First Nation.

To reduce the concerns and worries of the First Nations, the Proponent suggested that each hold follow-up meetings, one of which would address the fish offset plan. These meetings would make it possible to keep the First Nations informed of the design, implementation and evolution of the offset program. Other subjects of interest would also be discussed, including the state of Indigenous fisheries (Englobe, 2020f). This type of meeting, however, is not considered sufficient by the Kahnawà:ke First Nation to reduce its concerns about the effects of the Project on fish.

Changes in Land Access and Land Use

During the construction phase, navigation, recreational and family activities practised near the work site by the Huron-Wendat Nation and the W8banaki Nation will be disrupted by noise and construction activities (Englobe, 2020f). The Proponent indicated that public access to the river on the Québec Port Authority territory would remain open during the construction and operational phase. The Proponent also indicated that the Saint-André wharf would remain accessible during the construction work and that signage would be put in place to delineate the worksite, whose access would be temporarily unavailable.

The Proponent also considers that periods of work restrictions in the aquatic environment for fish during the summer could benefit members who wish to take advantage of the Beauport River and Bay for their activities (Englobe, 2020f).

During the operational phase, the Proponent believes some adaptation for Huron-Wendat users would be necessary because of the presence of new infrastructure that would encroach on a portion of one of their fishing sites. Increased marine traffic could also affect the quality of the experience (Englobe, 2018b). The Proponent indicated that the new infrastructure should not impede the usual navigation corridors of the W8banaki-Aki Nation and that the Project would not cause increased marine traffic between Québec City and Montréal, a sector used by W8banakiak and Mohawk fishermen and users. The Proponent is also

examining the possibility of free access for First Nations members to boat-launching ramps in the territory under its jurisdiction (Englobe, 2020f).

To reduce the effects of the Project, the Proponent has proposed to First Nations who wish to do so, to participate in a periodic follow-up in connection with the environmental follow-up and offset program during the construction and operational phases. This follow-up would consist of meetings adapted and planned according to the interests and concerns of each of the First Nations. For the Huron-Wendat Nation, the Proponent proposed to continue the follow-up meetings held within the framework of the Permanent Working Table to maintain exchanges and communication on the Laurentia Project (Englobe, 2020f).

As with fishing and migratory bird hunting activities, the Proponent would provide First Nations representatives with the construction schedule for distribution to the communities so members can plan their activities accordingly.

In order to analyze and manage as much as possible the Project's potential effects on downstream navigation, the Proponent also committed to the Innu First Nations to develop a ship monitoring program, particularly in the area between the approach of Les Escoumins pilot station and the Saguenay River estuary. This program would involve user members of the community and Innu Frist Nations businesses that operate in this sector.

5.9.3 Agency Analysis and conclusions on Residual Effects

Effects Analysis

With respect to the construction phase, the Agency believes that the Proponent has provided an adequate analysis and drawn appropriate conclusions regarding the effects of the construction site and noise on activities carried out near the construction zone, including First Nations fishing and hunting activities, particularly the Huron-Wendat Nation. The Agency considers that the implementation of follow-up meetings and the continuation of meetings within the framework of the Permanent Working Table for the Huron-Wendat Nation would allow the Proponent and First Nations to discuss the Project's progress and the concerns of the various communities in a cooperative manner.

With respect to the operational phase, the Agency also believes that the Proponent's analysis and conclusions are adequate with respect to the effects caused by disturbance and noise on First Nations activities, particularly hunting and fishing activities of the Huron-Wendat Nation. The increase in marine traffic generated by the Project could cause additional disturbances to members in the extended study area. Since vessels would use the same waterways they currently use, it is likely that the increase in traffic, whose annual variation would be 52 to 156 vessels, would be barely noticeable in an environment where the average annual vessel movement is 5,000 to 6,000 (Englobe, 2020f).

However, the Agency believes the Project could impact fishing in the St. Lawrence River and its estuary, and the resulting use for First Nations in relation to habitat loss and modifications caused by the encroachment of the Project and dredging on migratory species such as striped bass, lake sturgeon, Atlantic

sturgeon and American shad. Thus, the Agency is of the opinion that the Project could modify fishing-related activities and customs such as food for subsistence, community sharing and intergenerational knowledge transfer in the following ways, for each of the nations:

- Huron-Wendat Nation: Fishing activities and customs involving lake sturgeon and Atlantic sturgeon;
- W8banaki Nation: Fishing activities and customs involving lake sturgeon and Atlantic sturgeon;
- Essipit, Pessamit and Pekuakamiulnuatsh First Nations, and more specifically the Essipit First Nation: Fishing activities and customs involving lake sturgeon;
- Wolastoqiyik (Maliseet) Wahsipekuk First Nation: Fishing activities and customs involving lake sturgeon;
- Mohawk First Nations, and more specifically the Kahnawà:ke First Nation: Fishing activities and customs involving lake sturgeon and American shad.

As mentioned by the Grand Conseil de la Nation Waban-Aki, fishing may be particularly affected by the effects of the Project on fish and fish habitat for certain subgroups of the population, such as women or Elders.

It is also important to note that First Nations representatives promote the release of striped bass and sturgeon among their members to help these populations recover. It should also be noted that traditional striped bass fishing is important for all communities that wish to see it become an important activity for their members again. The Agency therefore considers that the striped bass fishery, which could resume once the conditions necessary for its practice are restored, could be compromised by the effects of the Project on the species.

First Nations expressed concerns about the Project's effects on fishing migratory species of interest. The Grand Conseil de la Nation Waban-Aki, for example, stated that striped bass is a species valued by the Nation and that its recovery could make it possible to support a fishery in the portion of the St. Lawrence River included in their traditional territory. It is also concerned about the effects that the decrease in fish populations could have on uses. More specifically, members could be encouraged to fish other species of fish. Finally, the Mohawk Council of Kahnawà:ke is concerned about the reduction of migratory species at traditional sites following the construction and operation of the terminal. The Project's effects on sturgeon, striped bass and American shad populations are of particular concern to this First Nation.

Agency's Conclusion

Based on its analysis and the assessment criteria presented in Appendix A, the Agency has concluded that the Project is likely to cause significant adverse environmental effects on the current use of lands and resources for traditional purposes (Appendix B) even with the implementation of key mitigation measures. The Project's effects on fish and fish habitat, particularly on striped bass, lake sturgeon, Atlantic sturgeon and American shad, could reduce these fish populations that are prized, valued and fished by First Nations and, consequently, have repercussions on the practice of fishing and fishing-related activities and customs. The Agency concludes that the effects would be significant for the following reasons:

- The magnitude of the Project's effects would be high because the Project would modify the conditions of traditional practices in a way that would compromise current use by Indigenous people and, more specifically, striped bass, lake sturgeon, Atlantic sturgeon and American shad fishery.
- The Project would have regional and long-term effects since they would be felt by several Indigenous communities that fish along the St. Lawrence River, from Montréal to the Estuary. In fact, the Project would affect migratory fish species that travel long distances. The effects would also be felt in the long term since fishing practices would be affected by the decrease in fish populations impacted by the Project. The population decrease would be caused by the loss of habitats necessary and important to the life cycle of the fish.
- Adverse effects would be continuous because they would be felt throughout the Project's operational phase and would be irreversible in time since current use will not likely return to its initial state considering that the affected fish stocks are already in a precarious state.

Identification of Key Mitigation Measures

The Agency has identified below the main mitigation measures likely to decrease the Project's potential effects. Also, key mitigation measures, particularly for navigation, have been identified in Section 5.8 (Socio-economic conditions). To identify the key mitigation measures, the Agency took into account the measures proposed by the Proponent, the advice of government authorities, as well as comments received from the First Nations consulted and the public.

However, these measures would not mitigate the Project's potential effects on current uses to render the residual effects insignificant. Should the Project be allowed to proceed, the government will consult with First Nations to determine what additional mitigation or accommodation measures would be required to mitigate the impacts on current uses of resources for traditional purposes:

- Transmit the construction work schedule to representatives of various First Nations to inform users who practise traditional activities near the Project site;
- Have regular follow-ups with First Nations who wish to do so regarding the design, implementation and evolution of the environmental follow-up program for damages caused to fish and fish habitat. These meetings would be adapted and planned according to the interests and concerns of the interested First Nations in order to exchange and discuss the potential effects that could be linked to the Project;
- Facilitate access for First Nations members to the territory under the jurisdiction of the Québec Port Authority;
- Implement the fish and fish habitat mitigation measures identified in Subsection 5.4.2 to limit effects on fish and fish habitat;
- Implement the mitigation measures for accidents and malfunctions under the responsibility of the Proponent presented in Section 6.1 to avoid adverse effects on resources.

Need for Follow-up and Follow-up Requirements

According to the *Canadian Environmental Assessment Act, 2012* (CEAA 2012), a follow-up program is used to verify the accuracy of a Project's environmental assessment and to judge the effectiveness of measures to mitigate adverse environmental effects. However, the Agency believes that no follow-up program would sufficiently reduce the uncertainties associated with the significant adverse effects of the Project on the current use of lands and resources for traditional purposes. However, the Agency recommends the following follow-up program to assess the effectiveness of the mitigation measures:

- The Proponent shall develop, prior to construction and in consultation with First Nations and competent authorities, a follow-up program to verify the accuracy of the environmental assessment and to judge the effectiveness of the mitigation measures with respect to the adverse environmental effects on:
  - Indigenous fisheries of the following fish species: striped bass, lake sturgeon, Atlantic sturgeon and American shad;
  - Migratory bird hunting that takes place within the Québec Port Authority's area of jurisdiction.

5.10 Physical and Cultural Heritage

The Project could have residual effects on the physical and cultural heritage, particularly through the backfilling in the river and the presence of tall structures. However, the Agency is of the opinion that the Project is not likely to cause significant residual adverse environmental effects, taking into account the application of the mitigation and follow-up measures recommended below.

The following subsections present the information considered by the Agency in its analysis to conclude on the significance of the Project's effects on physical and cultural heritage, including the advice and comments of expert departments, First Nations consulted and the public.

5.10.1 Description of the Component "Physical and Cultural Heritage"

The Agency considers that physical and cultural heritage can include such things as land or a resource (e.g., an artifact, object, or place), as well as a structure, site, or thing of historical, archaeological, paleontological, or architectural significance that is distinguished from other things by virtue of the value attributed to it (Agency, 2015). Québec City's heritage ensemble, recognized for its physical and humanized landscapes, the historical and cultural heritage of First Nations and archaeological resources meet this definition.

The Proponent selected the expanded study area for the analysis of landscape and First Nations historical and cultural heritage, while the work site area was used for archaeological resources (Figure 3, Chapter 1).

Heritage Landscape

The Laurentia Project fits into the visual environment of the industrial-port site in the Beauport sector of the Port of Québec. This sector includes components of various heights and widths typical of industrial zones, which isolate the area. It also includes sites dedicated to recreational activities on the Baie de Beauport beach and the bicycle path of the Corridor du Littoral.

Because of its location near the St. Lawrence River, the Project would be visible to users of the Seaway (St. Lawrence River landscape), particularly during the practice of tourist and recreational activities, as well as the western tip of Île d'Orléans (rural landscape) and the north and south shores of the river (alternating urban, industrial and recreational-tourism landscapes). The urban landscapes of Québec City and Lévis have many heritage features, including the Fortifications of Québec, the Forts-et-Châteaux-Saint-Louis National Historic Sites, which include the Dufferin Terrace, and the Lévis Forts. In addition, the Historic District of Old Québec is a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site, which is co-managed by Parks Canada, Québec City and the Government of Quebec through the Ministère de la Culture et des Communications du Québec.

The Proponent has defined ten landscape units within the expanded study area (Table 15). A detailed baseline condition for each was used to assess the Project effects presented in Englobe (2020o).

Table 16: Landscape units defined in the expanded study area and viewpoints used in the Proponent's visual simulations.

Landscape unit	Point of view
Lomoilou Urban Landscape (U1)	None
Beauport Urban Landscape (U2)	None
Downtown Québec City Urban Landscape (U3)	Remparts Street (PT3)
Lévis Urban Landscape (U4)	Duplessis Street (PT13) Jolliet Strike (PT14) Paquet Wharf – Québec-Lévis Traverse (PT18)
St. Charles River Recreational Landscape (RT1)	Mouth of the St. Charles River (PT2)
Cap-Blanc Recreational Landscape (RT2)	Pier 22 – Cruise Terminal (PT4) Marine Marchande Square (PT5) Dufferin Terrace (PT19)
Port of Québec Industrial Landscape (I1)	Baie de Beauport (PT1) Pier 24 – Bunge Site (PT6)
Lévis Industrial Landscape (I2)	None
St. Lawrence River Landscape (F1)	CN Rail Yard (PT7) Mouth of the Beauport River (PT8) Des Chutes Boulevard's Wharf (PT9) View of Baie de Beauport from the St. Lawrence River (PT10) Offshore of Davie Canada Inc. (PT12) Near the Davie Canada Inc. construction site. (PT15) View north from the St. Lawrence River (PT16) Île d'Orléans Bridge (PT20) View towards the west from the middle of the St. Lawrence River (PT21)
Île d'Orléans Rural Landscape (R1)	Anse aux Canots (PT11) Parking La Goéliche (PT17)

First Nations Historical and Cultural Heritage

According to the Proponent, four sites of historical and cultural interest, cited by the Huron-Wendat Nation, are located near the Project, namely the sites of Stadaconé, the former Huron-Wendat village near Sainte-Pétronille at the western tip of Île d'Orléans, the former Sillery mission and Pointe à Puiseaux. The Stadacona site, located on the site of present-day Québec City, and the former Huron-Wendat village on Île d'Orléans at Sainte-Pétronille, occupied between 1651 and 1657, are within the expanded study area. The other two sites are both outside the expanded study area. The exact location of the Stadacona site has not been identified. This site is of historical importance for the Huron-Wendat Nation since it is the meeting place between the explorer Jacques Cartier and the Iroquoians in 1535-1536 (Englobe, 2018d).

According to the information sources and documents consulted by the Proponent, the Québec City site, the St. Charles River, Sillery Cove and Île d'Orléans are important heritage sites for several First Nations. The Huron-Wendat Nation and the Innu First Nations in particular noted the importance of those areas (Englobe, 2020d). The Innu First Nations noted that the Project site location has been valuable and nurturing for human life since time immemorial for several Nations.

In addition, one of the heritage values[52] of the St. Lawrence River is its use by Indigenous peoples who were the first human beings to navigate the St. Lawrence River. For millennia, they have relied on its resources and used its waters as a means of travel for meetings and trade.

Terrestrial and Underwater Archaeology Heritage

According to the Proponent, the terrestrial portion of the work presents very little archaeological potential since the entire Beauport port area has been an artificially created environment since the 1960s (Englobe, 2020w). Parks Canada Agency and the Ministère de la Culture et des communications du Québec states that studies on the history of the site and past occupation of the shoreline show that the site where the terminal would be developed has never been built on in the past. However, the area does have strong marine archaeological potential because of its long history as a port. The study carried out by the Proponent showed that there are several shipwrecks in the expanded study area. However, no wreck sites protruding from the river bed are located in the construction zone. It is nevertheless likely that the area has some small to medium-sized archaeological resources, such as ship deck fittings[53] (e.g., lost anchors or chains) (Englobe, 2020w).

In addition to the archaeological potential study, underwater geophysical surveys were conducted by the Proponent in part of the work area. However, those activities were not carried out in collaboration with an underwater archaeologist and are seriously flawed, according to Parks Canada Agency. Consequently, Parks Canada Agency is of the opinion that those activities did not determine whether submerged archaeological resources were present, or their nature or heritage value. To remedy these shortcomings, the Proponent proposed an archaeological intervention plan that it would implement before work began and continue throughout all phases of the Project (Englobe, 2020w).

Répertoire du patrimoine culturel du Québec (gouv.qc.ca) : Répertoire du patrimoine culturel du Québec (gouv.qc.ca)

[53] All the superstructures of a ship

5.10.2 Analysis of Potential Effects and Proposed Mitigation Measures

Landscape Heritage

The promontory of Cap Diamant, the river, the profile of the Laurentians, the bridges and the Montmorency Falls are emblematic landscapes that make Québec City famous in terms of tourism (Ville de Québec, 2005). In addition, the memoirs of the members of the Association des kitesurfers et véliplanchistes de Québec (AKVQ), attest that the St. Lawrence River, in the Project area, offers a breathtaking view of the Baie de Beauport that could be affected by the Project.

According to the Ministère de la Culture et des communications du Québec, the Project is situated in an extraordinary, highly valued cultural landscape at the crossroads of the heritage sites of Old Québec (included in the UNESCO World Heritage List), Beauport and Île d'Orléans and near the St. Lawrence River, designated as a historic site under the *Cultural Heritage Act* (CHA). A number of concerns have been raised by the public about the Project's potential risk to the UNESCO World Heritage designation of the Historic District of Old Quebec.

According to the Agency and the Ministère de l'Environnement et de la Lutte contre les changements climatiques du Québec (MELCC), the public consultations on the Laurentia Project demonstrate the value placed on heritage and the cultural landscape by the public and the residents of Québec City. In order to visualize the potential effects of the Project on the landscape, simulations were prepared by the Proponent (Englobe, 2020o). These simulations were carried out at different times of the year from 21 points of view (see Figure 11 and Table 15). These viewpoints were selected to respond to the concerns expressed by citizens and environmental groups about the visual impact on the Project's landscape, linked to the presence of numerous historic sites, heritage sites and landscape observation points in the region. They take into account nearby residential areas, sites of heritage significance, emblematic landscapes and locations dedicated to recreational and tourism activities.

According to the Proponent, few visual breakthroughs on the Port of Québec would be possible from the urban landscapes of Limoilou (U1), Beauport (U2) and downtown Québec City (U3) as well as for the recreational-tourism landscape of the Saint-Charles River (RT1). The effect felt on the industrial landscapes of the Port of Québec (I1), with the exception of the Baie de Beauport sector, and Lévis (I2), would be slight due to the Project's insertion in an already industrialized environment and the nature of the activities taking place there. However, it was mentioned by the public that the Beauport Urban Landscape Unit (U2) offers views of the Port of Québec due to the sloping landscape facing the river.

The proposed infrastructure would be visible to residents, tourists and users of the Île d'Orléans Rural Landscape (R1). However, the angle of these viewpoints in relation to the Project means that the existing harbour landscape would partially absorb the new infrastructure that would be put in place. In the urban landscape of Lévis (U4), residents near certain viewpoints and recreational and tourist users who frequent the shoreline would be able to see distinctly the new structures that would extend above the skyline, just as

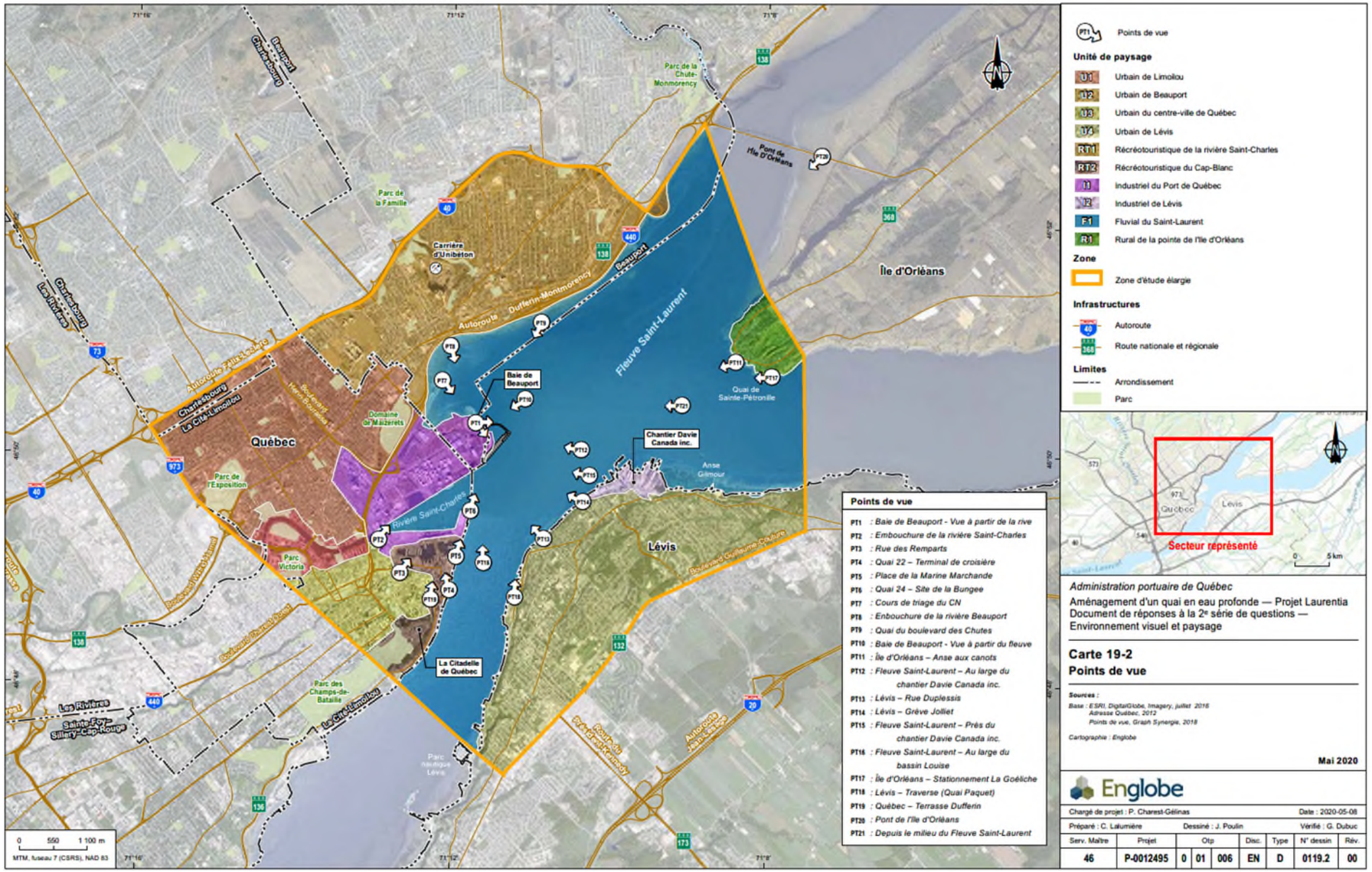
they do for the existing facilities of the Port of Québec. This would limit the integration of the overhead structures into the landscape and would significantly alter the landscape for these observers.

In the Cap-Blanc Recreational Landscape Unit (RT2), the Project would generally have no visual effect on the many historical and heritage sites in the Historic District of Old Québec since most viewpoints are closed due to the narrowness of the streets and the topography of the sector. However, the Project would be visible from certain viewpoints that offer an open view of the St. Lawrence River and the Port of Québec. The view would be modified by extending the existing infrastructure into the industrial landscape of the Port of Québec, such as the Dufferin Terrace, which is a visual point of interest for observers. From this point of view, observers would have an open view of the Project, but the observer's gaze could be directed more towards the St. Lawrence River, Île d'Orléans or the city of Lévis than towards the industrial sector of the Port of Québec.

The views of the Baie-de-Beauport sector of the Port of Québec Industrial Landscape Unit (I1) and the St. Lawrence River (F1) are those that would be most affected by the Project, since it is in these landscape units that the Project would be implemented (Figure 12). These sectors are highly valued by users of the Baie-de-Beauport since the practice of their activities is linked to the degree of appreciation of the river landscape. Depending on the location of the observer, overhead structures would partially or even completely obstruct (from certain specific angles) the view of downtown and the Château Frontenac by observers during navigation in the sector. In the Baie-de-Beauport beach sector, the view of the river would be partially obstructed by the new installations, but also by the visual and acoustic screen. These facilities would be added to the existing port facilities.

The MELCC is of the opinion that by encroaching on the river, designated as a historic site under the *Cultural Heritage Act*, the Project would affect one of the most significant areas in Quebec’s history. Individuals and organizations are concerned about the changes that the presence and operations of the container terminal might make in the landscape, whose high heritage value could be seriously affected by the Project. In particular, they have concerns about the following National Historic Sites: the Fortifications of Québec, the Saint Louis Forts and Châteaux, Montmorency Park and the Lévis Forts.

Figure 12: Presentation of landscape units and viewpoints used for visual simulations



Source: Englobe, 2020o

Figure 13: View of the Projected infrastructure from the Baie de Beauport (PT1) without (top) and with the Project (bottom)

Source: Englobe, 2020o

In order to mitigate the effect of the Project on the landscape, the Proponent has undertaken to plan its choice of materials and colours in such a way as to visually harmonize the structures with the landscape, particularly with regard to the cranes, within the limits of the relevant safety rules. The Proponent also proposes to maintain its buildings and infrastructure to avoid degradation and the decline of their appearance for their entire life.

In addition, the Proponent proposes to install a visual and acoustic screen in the Baie de Beauport beach sector to reduce the visual aspect of container storage (see Figure 13). The visual aspect of this screen is a concern raised by environmental groups and citizens, who would like to see measures aimed at better landscaping integration of the wall initially proposed. To address this concern, the Proponent proposes to design the screen in collaboration with the community of the Baie de Beauport Users' Forum. The wall would be made of attractive materials and colours and would also include an area dedicated to the practice of rock climbing to ensure its integration into the activities of Baie de Beauport users. It would also include containers that would allow for the addition of service areas near the use and storage areas. Finally, native plants would complete the integration of the screen into the Baie de Beauport landscape. The public expressed concern that the model proposed by the Proponent provides for the plants to adequately cover the visual and acoustic screen only after 15 years. Some citizens recommended that a measure be implemented as soon as the screen is built, such as the installation of an artistic wall. In response to this request, the Proponent mentioned that the concept for the visual and acoustic screen was based on simplicity and the use of natural materials, such as rock wool and wood, to ensure optimal integration of the screen into the existing landscape.

Environmental groups and citizens have also raised concerns about the durability of the screen, the maintenance work required for long-term plant life, the list of plant species chosen to cover the containers, and the detailed structure of the screen wall. The Proponent proposed a preliminary 10 to 15-year maintenance program, including a plant care and maintenance program, which outlines key milestones and measures to be put in place in the event of plant degradation. The presence and use of the cranes looming on the horizon and the view blocked by the visual and acoustic screen are also of concern to users of the Beauport Bay site, whose overall experience could be affected.

Figure 14: Concept of the visual and acoustic screen in the Baie de Beauport beach sector.

Source: Englobe 2020o

Monitoring and follow-up activities related to the landscape would be integrated into the Proponent's planned community relations management. These activities would include, in particular, the steps taken with interest groups, including the Baie de Beauport Users' Forum, meetings of the Port-Community Cohabitation Committee (which would be in operation throughout the construction phase and for the first two years of operation of the Project) and the Port Operations Awareness Committee, as well as the consideration of comments and concerns gathered during meetings with the various stakeholders.

In addition, the Proponent plans to manage any complaints and questions that may arise. Citizens and interest groups could ask questions or make comments and suggestions during the construction and operational phases of the Project. The Proponent would publish a "Questions-Answers" section on the Internet page dedicated to the Laurentia Project, in order to disclose information in response to certain questions or concerns. In addition, the Proponent would send out targeted surveys in years 1 and 3 following the start of operations. These surveys would gather general concerns and comments from interest groups and citizens about the Laurentia Project. The results of the surveys would also be posted on the Proponent's website within approximately 30 days of the completion of the survey.

First Nations Historical and Cultural Heritage

According to the Proponent, construction and operation activities do not threaten the integrity of First Nations heritage and cultural sites since these are located outside the construction zone (Englobe, 2020f).

Terrestrial and Underwater Archaeology Heritage

The main potential effect on underwater archaeological resources would be associated with the risk of damaging or destroying archaeological resources, both during the construction phase and during the operational phase. For the construction phase, this risk is related to site preparation, the construction and placement of the reinforced concrete caissons, the construction of the retaining dike, the dredging of sediments and the presence of the new port infrastructure (wharf and back wharf). As for the operational phase, potential effects are associated with maintenance dredging and marine navigation.

Data provided by the Proponent suggests that anticipated effects on large archaeological resources, such as shipwrecks, are unlikely in the work area.

For medium and small resources, Parks Canada believes that there are significant gaps in baseline condition. To address this lack of information and in response to the Parks Canada Agency's recommendations, the Proponent submitted an archaeological intervention plan (Englobe, 2020o) in which it details the field work to be carried out to acquire the missing scientific data, the actions to be implemented in the event of archaeological artifact discoveries, and the mitigation and monitoring measures to be put in place to limit the risks associated with the Project. Following the review of the archaeological intervention plan, Parks Canada is of the opinion that this plan is adequate and would reduce the risks to the artifacts if the planned archaeological interventions are carried out in accordance with the standards and principles of underwater archaeology and the recommendations of a marine archaeologist. The results of the work planned in the archaeological plan would be presented to the Agency and Parks Canada as soon as they

are available, as well as to First Nations who have expressed the wish to do so (Englobe, 2020f). Finally, the proposed mitigation measures were deemed adequate and sufficient by Parks Canada. The complementary inventories provided for in the archaeological intervention plan would be carried out prior to the start of the work.

Parks Canada notes that the presentation of archaeological resources through a public, virtual or physical exhibit could be considered by the Proponent for any documented archaeological resource of significant heritage value, based on the recommendations of the marine archaeologist.

Monitoring and follow-up activities related to archaeological resources would be established by the Proponent based on the results of the inventories provided for in the archaeological intervention plan. The Proponent indicates that monitoring by an archaeologist during dredging may be recommended (Englobe, 2020o), particularly in high-potential areas that could not be verified by diving or using an unmanned underwater vehicle. In the case of an accidental discovery of an archaeological site, the Proponent has planned monitoring measures based on Parks Canada's *Guidelines for the Conservation of Archaeological Sources* (2005). These measures stipulate that in the event of an incidental archaeological discovery on land or underwater, workers must notify the person in charge of the work site and immediately suspend work that is likely to affect the discovery. In all cases, the Proponent would collaborate with the competent authorities to determine the significance of the discovery and the level of protection required. Finally, as part of its monitoring and follow-up program, the Proponent would produce an annual report that would incorporate the results of the archaeological monitoring, which would be produced by the marine archaeologist. Parks Canada considers this monitoring program during the construction phase to be adequate.

For the operational phase, the Proponent has not planned any mitigation measures during the activities, since it considers that the volumes of sediments to be dredged during maintenance would be low and that dredging activities would be located in the areas included in the capitalization dredging (dredging carried out during the work). No monitoring or follow-up program is planned by the Proponent for this phase. Parks Canada is of the opinion that it would not be necessary to implement a monitoring or follow-up program during the operational phase, if the planned archaeological intervention plan is applied in accordance with the standards and principles of underwater archaeology and with the recommendations of a marine archaeologist. The MELCC also considers that the intervention strategies planned in the event of a discovery adequately take into account the underwater archaeological heritage.

For the Proponent, the long-term effects of the Laurentia Project do not represent a major potential risk. However, Parks Canada considers that the Project could affect the wrecks (confirmed and potential) identified in the administrative zone of the Port of Québec. Parks Canada remains concerned about the effect of future dredging, increased tonnage and marine traffic, which could jointly generate underwater erosion affecting wrecks (confirmed and potential). It therefore encourages the Proponent to proactively manage archaeological resources, including known shipwrecks within its property boundaries, in order to limit uncertainties for the future. The acquisition of historical and archaeological data on the archaeological remains located on its properties would represent a great opportunity for the development of cultural heritage that could be integrated into other public initiatives already planned by the Proponent.

5.10.3 Agency Analysis and Conclusions on Residual Effects

Residual Effects Analysis

With regard to landscapes, the Agency notes that the sector targeted by the Project is already characterized by port and industrial infrastructure, with a certain capacity to absorb new infrastructure. The quality of the landscapes of the Québec City heritage complex is highly valued by the region's population as well as by Québec City, which has integrated landscape protection into its land-use planning and development documents. The Historic District of Old Québec is a UNESCO-protected site, and the urban landscapes of Québec City and Lévis contain many heritage elements protected by the Government of Canada and the Government of Quebec.

The visual influence of the infrastructure on these sectors would generally be weak since few visual openings are possible towards the Project site from most of the viewpoints analyzed by the Proponent.. However, despite the mitigation measures proposed by the Proponent to reduce the Project's effects on the landscape (Englobe, 2020r), they do not completely mitigate the visual effects for observers located in the landscape units of the Port of Québec (I1), Cap-Blanc (RT2), Lévis (U4) and the St. Lawrence River (F1), particularly for users of the Baie de Beauport, visitors to the Dufferin Terrace, residents along St. Lawrence River in Lévis and users navigating on the St. Lawrence River in the Project sector.

Based on the MELCC's opinion and the concerns raised by the public during the consultations, the Agency believes that encroachment on the river could affect a portion of this historic site, designated under Quebec's *Cultural Heritage Act*, but would not compromise its integrity. Nor would access to or use of the site be compromised. On the other hand, river users and cruise operators (cruise ships or marine industries) would see a highly valued cultural landscape affected by the presence and operations of the container terminal. The presence of large container ships passing nearby could also detract from this landscape.

Other than the St. Lawrence River, the integrity of First Nations heritage and cultural sites would not be threatened by the construction and operation activities since those sites are on the terrestrial portion and outside the construction area.

Finally, for underwater archaeological resources, the Agency relies on the advice of Parks Canada and notes that, despite the uncertainties related to the baseline condition, the application of the contingency plan would limit the risks of damaging or destroying potential archaeological resources by providing for the acquisition of missing data and defining the methods for managing underwater archaeological resources in the event of a discovery. However, this plan must be carried out in accordance with the standards and principles of underwater archaeology and the recommendations of a marine archaeologist.

Agency's Conclusion

Based on its analysis and using the environmental effects assessment criteria presented in Appendix A, the Agency concludes that the Project is not likely to cause significant adverse environmental effects on physical and cultural heritage (Appendix B), taking into account the application of the key mitigation measures identified below. The Agency concludes that the significance of the effect would be moderate, not significant for the following reasons:

- The magnitude of the Project effects would be moderate in that the effects would result in the modification of certain characteristics of the particular character of the landscape and the St-Lawrwnce River as a Historic site, but the effect would not compromise the integrity of the physical and cultural heritage for the landscape units assessed and designated historic sites. As well, the effect would not compromise the integrity of anything of archaeological significance and the effects would not interfere with the maintenance or management of designated heritage features.
- The Project would result in a long-term, local-scale alteration to the landscape and at the historic site of St. Lawrence River through the introduction of embankments and elevated structures on the north shore of the St. Lawrence River. This modification to the landscape would be irreversible and continuous over time.

Determination of Key Mitigation Measures

The Agency has identified the key mitigation measures required to ensure that the proposed Project does not cause significant adverse residual environmental effects on physical and cultural heritage. It took into account the mitigation measures proposed by the Proponent, the advices of government authorities, as well as the comments received from First Nations consulted and the public. These measures are as follows:

- Use materials and colours for structures, such as cranes, that harmonize with the landscape;
- Design, prior to construction and in consultation with potentially affected parties, a visual screen and native plant species to the area to reduce the visual appearance of container storage;
- Revegetate landscaped slopes and bare areas as construction is completed. Use native species for this purpose;
- Develop and implement, in consultation with Parks Canada Agency and the First Nations, a procedure for dealing with chance finds made during the terrestrial construction phase. Under the chance-find procedure, the Proponent shall:
    - Immediately halt work at the location of the discovery;
    - Delineate an area of at least 30 metres around the discovery as a no-work zone;
    - Assign a qualified person who is an archaeologist to carry out an assessment at the location of the discovery; and
    - Consult Parks Canada Agency for advice and guidance.

- Fully implement the Archaeological Response Plan filed as an appendix[54] to the CEA Agency's Response Document to the Second Request for Additional Information of August 2019 – Physical, Cultural and Archaeological Heritage (Englobe, 2020w) in accordance with the standards and principles of underwater archaeology and with the recommendations or supervision of a marine archaeologist. These include, but are not limited to:
  - carry out additional studies and provide the results and recommendations to the Agency before work begins (point 5.2 of the intervention plan).
  - Put measures in place to ensure the conservation of archaeological sources in the case of chance discoveries (point 5.3 of the intervention plan).
  - For anomalies with high archaeological potential that could not be verified prior to dredging activities, carry out monitoring during dredging under the supervision of a marine archaeologist.
  - Present to the Agency, Parks Canada and First Nations who have expressed the wish to do so, as indicated in the document in Englobe (2020w), the results of the work planned in the archaeological plan and the annual review of the results of the archaeological monitoring.

Need for Follow-up and Follow-up Requirements

The effectiveness of the mitigation measures aimed at the harmonization of the structures and the installation of the visual and acoustic screen is uncertain. In order to verify the predictions of effects on physical and cultural heritage and the effectiveness of the proposed mitigation measures, the Agency recommends that the follow-up program include the following requirements:

- Develop and implement a follow-up program to validate the accuracy of the environmental assessment and judge the effectiveness of mitigation measures on the visual environment. The Proponent will have to compare photographs taken from points of view comparable to those used in the visual simulations carried out as part of the impact statement. Photographs must be taken every two years for the first 10 years following the end of construction and every 5 years thereafter, until 25 years following the end of construction. Corrections will be made as required if mitigation measures need to be modified or added to reduce the effects on the visual environment.
- The monitoring should make it possible to concretely evaluate the effect felt by residents and vacationers, for example by means of a survey that will be carried out after the Project is up and running.
- Monitor the growth, composition and abundance of vegetation and make the necessary corrections in case of plant degradation, including replacement of plants.
- Develop a pre-construction feedback protocol for effects on the visual environment. The Proponent will be required to implement the protocol during construction and operation.

[54] AECOM. 2020. Plan d'intervention archéologique subaquatique – Projet d'aménagement d'un terminal en eau profonde au port de Québec-Projet Laurentia. 37 pages and appendices

6. Other Effects Considered

6.1 Effects of Accidents or Malfunctions

Accidents and malfunctions are likely to occur during all phases of the Project, which could result in adverse effects on the Project and the surrounding environment. However, the Agency is of the opinion that these effects are unlikely to be significant due to accidents or malfunctions. The Proponent has properly identified the Project's inherent risks and would implement preventive measures that include the proper design of the infrastructure, its inspection and its maintenance. The Proponent plans to develop a detailed emergency response plan that would allow a quick and effective response in the event of accidents or malfunctions.

The following subsections present the information considered by the Agency, including the opinions and comments of the expert departments, First Nations consulted and the public.

6.1.1 Analysis of Potential Effects and Proposed Mitigation Measures

For the purposes of the environmental assessment, an accident is described as a sudden and unexpected event involving Project components or activities that result in damage to valued components. A malfunction, on the other hand, is described as the inability of equipment or a system to function as intended, resulting in damage to valued components. Accidents and malfunctions are likely to occur at all stages of the Project.

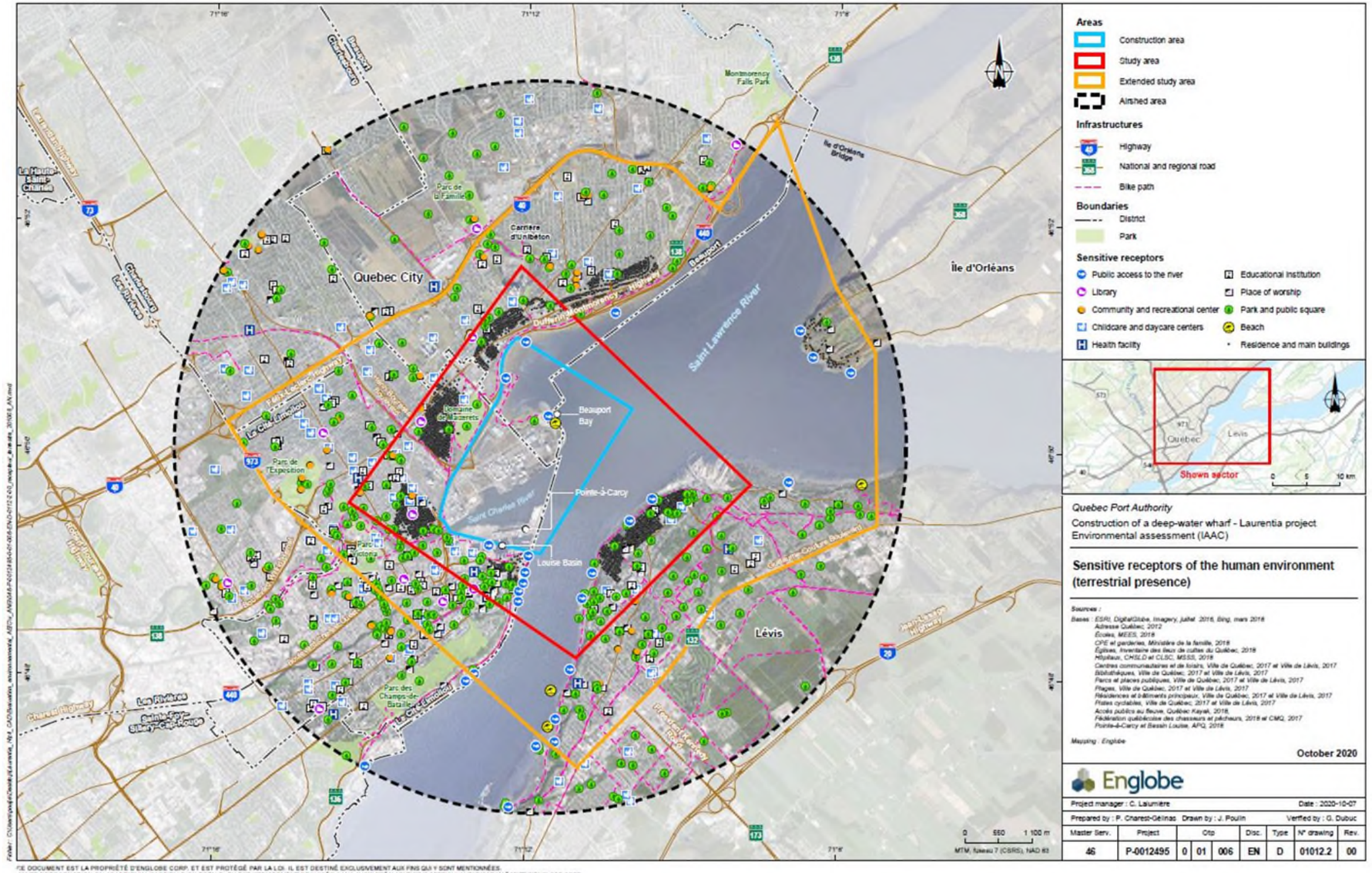
The environmental assessment takes into consideration the environmental effects of the Project, including those caused by accidents or malfunctions, which could affect all of the valued components assessed and described in Chapter 1. Environmental factors may also cause damage to the Project's land and marine infrastructure and increase the likelihood of an accident or malfunction occurring. The environmental effects on the Project, such as flooding and earthquakes, are discussed in Section 6.2.

Description of Sensitive Elements

The immediate territory of the Beauport port site is dedicated to industrial uses, except for Baie de Beauport, which is dedicated to recreational tourism. Certain activities conducted in this territory involve the use and storage of solid or liquid bulk or dangerous goods.

The Proponent identified the sensitive elements of the human, physical or biological environment that are found near the site and that could be affected by accidents or malfunctions. The elements include residents and visitors, as well as employees and other nearby industries and businesses, public infrastructures, parks and environmental elements (Figure 14). The residence closest to the Project site is located 1.3 kilometres away along Boulevard Montmorency (Englobe, 2018d).

Figure 15: Identification of sensitive receptors in the human environment in the vicinity of the Project site (terrestrial environment)



Source: Englobe, 2020s

Environment and Climate Change Canada and Health Canada indicate that the sensitive elements that could be affected by potential accidents or malfunctions, including drinking water intakes, were well identified.

Accident and Malfunction Risk Assessment and Potential Effects

The Proponent described the potential effects of accidents and malfunctions related to the Project, as well as the associated preventive and response measures.

The incidents most likely to occur during the Project construction phase are related to work, equipment and infrastructure developed temporarily and are primarily associated with potential minor terrestrial spills (Englobe, 2018d).

In the operations phase, the accidents and malfunctions that could occur are associated with the new terminal's terrestrial and marine operations (Englobe, 2018d).

The approach used by the Proponent to assess the effects of accidents and malfunctions is based on several steps, including identification of the sensitive elements of the environment, identification of the external risks and those associated with the Project, and then analysis of the worst accident scenarios and their potential consequences for the valued components of the environment, to thus determine the preventive and mitigation measures and provide for the emergency response measures.

The Proponent conducted an assessment of the technological risks, including a HAZID ("hazard identification") assessment and a quantitative assessment of the risks to which the population could be exposed. This quantitative risk assessment was used to optimize the configuration of the site and ensure that the classes of dangerous goods that would pass through the terminal did not present unacceptable risks for the population, goods and the environment (Englobe, 2018d).

Risks and Environmental Effects Related to Road and Rail Transportation

In the construction phase, the main risk analyzed involves a tank truck spilling its fuel contents into the environment during a major accident. According to the Proponent, transportation of certain construction inputs, including granular materials, would not have appreciable effects on the environment and on the neighbouring population, because the contents could be recovered without harming the integrity of the receiving environment.

In the operations phase, the main risk involves a truck spilling the contents of a dangerous goods container into the environment during a major accident, or an explosion or a fire with thermal and toxic effects, as well as propagation of a toxic cloud.

Environment and Climate Change Canada is of the view that the Proponent does not offer a sufficient justification to support its conclusions regarding the potential effects of a fire and the propagation of a toxic cloud. The Proponent concludes that an explosion or a fire that could occur during a truck accident could affect the wildlife or plant life contained within the radius of influence over a short period, considering the speed with which the gaseous contaminants are diluted and are attenuated with distance or when the fire is

extinguished. No study or illustration was presented to demonstrate or validate this information. Environment and Climate Change Canada recommends that the Proponent complete its review, at the time of the specific risk assessment, by using cloud dispersion modelling (modelling software) to confirm its conclusions.

For risks associated with road transportation, the Proponent proposes to deploy measures to encourage truckers to take routes that avoid more sensitive areas, such as Boulevard Henri-Bourassa and the residential zones. In this regard, Environment and Climate Change Canada recommended installing sign panels on the Proponent's property to alert truckers to drive slowly, especially in the most sensitive areas.

Concerning rail transportation, the main risks assessed are a low-speed car derailment on or near the terminal, involving one or more containers of hazardous materials, and a low-speed locomotive derailment involving perforation of a fuel tank. According to the Proponent, the environmental effects related to these accidents would be significantly reduced due to the low speed of the trains, the small quantity of hazardous materials transported and Canadian National's recognized good practices. Consequently, the potential effects would be limited to the track right of way and, in the worst cases, to contamination of the soil, a watercourse or a body of water depending on the location of the accident. Concerning the rail operations associated with the Project, Health Canada considers that the sensitive environments adjacent to the Project site, particularly the boroughs of La Cité-Limoilou and Maizerets, should receive special attention in case of accidents or malfunctions.

The Agency notes that transportation of dangerous goods by truck or train during the operations phase would not fall under the Proponent's liability and instead would be the responsibility of the various road or rail carriers. The road and rail carriers must have an emergency response plan in compliance with the requirements of the *Transportation of Dangerous Substances Regulation* (Quebec Highway Safety Code) and Transport Canada's *Transportation of Dangerous Goods Regulations.* In addition, traffic of heavy vehicles on Quebec roads is addressed by the *Act respecting owners, operators and drivers of heavy vehicles*. The implementation of these statutes and regulations can thus ensure safe transportation of dangerous goods and rapid response in case of accident. The rail carrier is also subject to the *Railway Safety Management System Regulations*, which establish the minimum requirements regarding the safety management system that every company must develop and implement in view of achieving the highest safety level in its railway operations. The Proponent intends to deploy mitigation measures to minimize the probability and consequences of potential accidents and malfunctions associated with rail transportation during operation, such as preventive inspection of containers and regular equipment maintenance.

The effects of this type of accident or malfunction on health and safety are a concern raised by the public, particularly concerning rail transportation of dangerous goods and the risks of spills. These concerns were exacerbated following the railway accident in the municipality of Lac-Mégantic.

Risks and Environmental Effects Related to Marine Transportation

At the wharf, the Proponent concludes that the most frequent and credible risk of incidents is linked to spill of hazardous materials resulting from a breakdown on the loading arms. In a high tide period (October), such an uncontained spill could momentarily reach the three water intakes in the river after 12 hours, but would have left the site of the water intakes after 48 hours.

On the river, the worst accident scenario would be a collision or grounding of cargo ships, leading to a fuel spill in the port waters at the Traverse du Nord. The Proponent surveyed the components of the biological and terrestrial environments that could be affected.

According to Environment and Climate Change Canada, the Proponent adequately explained the possible consequences of accidents related to navigation. Using modelling, it was demonstrated that the effects on the receiving environment would vary according to the magnitude of the spill, the product spilled and the response time of the cleaning operations.

In its Impact Assessment Report (Englobe, 2018d), the Proponent explains how safety is governed in the marine environment. It also describes that risk prevention and mitigation measures for the safety of the berthed vessels, including a description and a simulation of the projected berthing and unberthing maneuvers.

The spill and collision risks in relation to marine transportation and their cargo are major concerns raised by the W8banaki Nation, the Innu First Nations of Essipit and Pessamit and the Mohawk Nation of Kahnawà:ke. The risks of petroleum product spills and point-source leaks from machinery and the accident risks in relation to handling of containers by heavy machinery, are concerns raised by the public.

Risks and Environmental Effects Related to Handling of Dangerous Goods

In the operations phase, it is projected that a maximum of 3% of the goods transported by container under the Project would be classified as dangerous goods. They include various products, materials and organisms, flammable liquids, corrosive materials, combustive materials and organic peroxides, toxic materials, flammable solids, gases, radioactive materials and explosives.

To determine the risks and effects of accidents and malfunctions associated with the handling of containerized goods, the Proponent reviewed the worst accident scenarios. These scenarios were also modelled to account for the typical daytime and nighttime atmospheric stability conditions, considering that the recreational tourism zone of Baie de Beauport is adjacent to the Project site and that this area is considered to be unoccupied at night and during the winter period. The risks of anthropogenic origin external to the Project were also taken into consideration (Englobe, 2020s; Englobe, 2018d).

A quantitative risk assessment was also conducted for each class of dangerous goods that could pass through the new terminal, except for Classes 2.1 (flammable gases), 2.3 (toxic gases) and 3 (flammable liquids). This quantitative assessment allowed estimating of the individual and societal localization risks for the worst accident scenarios.

The MELCC, in reviewing the Proponent’s result, finds that a hydrochloric acid or chlorine spill would be followed by the formation of a toxic cloud that would encompass the Baie de Beauport recreational tourism site and reach the residential areas on both sides of the river under nighttime conditions. However, a certain response time would be available, which would allow the people present in the recreational tourism zone and those situated in the path of the plume to take shelter or evacuate the site.

For the MELCC, an emergency preparedness plan (EPP), including a clear and efficient lockdown or evacuation, must be implemented to reduce these risks.

Another scenario of concern for the MELCC is a boiling liquid expanding vapour explosion (BLEVE) involving propane. This phenomenon can occur when a tank is heated beyond the boiling point, at atmospheric pressure, of the flammable liquid it contains, followed by the catastrophic rupture of the tank. The liquid thus is vaporized and may create a fireball in case of ignition. Because the BLEVE does not occur instantaneously, the Proponent would have a certain time to respond, thus allowing the people present in the Baie de Beauport zone to take shelter. According to the MELCC, it is possible to manage the risk incurred by deployment of adequate emergency measures. It must also be recalled that there is a very low probability of the occurrence of such a phenomenon.

The MELCC considers that the operation of the container terminal is not incompatible with the use of the Baie de Beauport recreation site, depending on the risk acceptability criterion of the Major Industrial Accidents Council of Canada (MIACC), because the recreational tourism zone, in part, is between the industrial risk levels of 3x10-7 and 1x10-7 deaths per year.

Environment and Climate Change Canada considers that the risk assessment was presented adequately and that the Proponent used an internationally recognized standard method. It recommends, as mentioned by the Proponent, that the future operator of the container terminal, Hutchison Port Holdings Limited, produce a risk assessment specific to handling and storage of dangerous goods of Classes 2.1 (flammable gases), 2.3 (toxic gases) and 3 (flammable liquids). This assessment must be able to determine the safe handling and storage procedures and the control measures to account for sensitive receptors (Englobe, 2020s).

The public raised several concerns in relation to the proximity of a marine terminal where dangerous goods are in transit, particularly following the disaster that occurred in the Port of Beirut on April 4, 2020. Moreover, a citizen pointed out that the peninsula of Baie de Beauport only had one road access, Boulevard Henri-Bourassa, and expressed concern about this situation in case of accidents or malfunctions.

Other Environmental Risks and Effects Associated with These Risks

During the construction phase, spills or leaks of other hazardous material could occur following their use, handling or storage (Englobe, 2018d). A machinery breakdown, perforation of a pipe or a tank, or human error could be at the origin of a spill of hazardous material. This type of accident is the most likely to occur during handling.

The Proponent surveyed other project-related risks, such as a spill of contaminated sediments in water, a dike breach, major breakdowns or malfunctions of structures. It established the main causes that could engender these situations, but without producing an in-depth analysis of the associated risks, due to the low probability of harmful effects. The Proponent presented a detailed matrix of the assessment of the potential consequences of incident risks in the terrestrial and river environment. The consequences thus are established for all components of the physical, biological and human environment, both for accidents in the terrestrial environment or in the river environment (Englobe, 2018d).

External Risks of Anthropic Origin

External risks of anthropogenic origin are mainly related to industrial facilities in the vicinity of the proposed Project (Englobe, 2018d). The territory adjacent to the Project site is dedicated to industrial uses, with the exception of Baie de Beauport sector, which is used for recreation and tourism. Ongoing activities at the Port of Québec include, among others, the reception and storage of liquid bulk. The proposed biomethanization plant, IMTT Québec Inc, VOPAK, Glencore, QSL and Arrimage Saint-Laurent are industrial facilities presenting external risks of anthropogenic origin. The biomethanization plant Project will be used to stabilize domestic waste. According to the Proponent, the potential risks of these companies are mainly related to air quality, safety, health and spills. Because of the potential interactions with the Project site, the presence of these activities is considered in its risk analysis of accidents and malfunctions. However, the Proponent concludes that the worst-case accident and malfunction scenarios for the Project under study do not present consequences that could affect neighbouring facilities.

Emergency Response Plan

Various initiatives have been proposed by the Proponent to prevent the accidents and malfunctions listed above and to reduce their environmental risks (Englobe, 2020r). Among other things, the Proponent has an emergency response plan for its current port operations that serves as a tool for managing emergency situations that could arise within the administrative boundaries of the Port of Québec (Englobe, 2018d).

The Proponent has initiated an update of its emergency response plan to include the following:

- Risks specific to container handling and storage operations and their potential consequences;
- Information and mapping on sensitive elements (areas) and receptors in the environment and surroundings that may be affected;
- The identification, development or updating of intervention strategies according to the potential risks to sensitive elements (sectors) and receptors in the environment and surroundings;
- The identification of external emergency response plan resources (federal, provincial, municipal actors and harbour users) as well as the mechanisms for coordinating the response.

The Proponent's emergency response plan includes response strategy in case of: fire or explosion on land, fire or explosion on board a ship, ground pollution, air pollution, water pollution, shipboard accidents, acts of terrorism and bomb threats, severe weather conditions or any other major incident in the Beauport sector. In the event of incidents in Beauport Bay, specific emergency measures are in place. If necessary, specific response plans could be developed in collaboration with the users of future facilities to take into account their operations and the resources available to them (Englobe, 2018d). Health Canada is of the opinion that the Proponent's alert system and the frequent updating of its emergency response plan, including an exercise program with key stakeholders, would prove to be very important to protect users of the Baie de Beauport recreational tourism site in the event of accidents or malfunctions.

Based on the results obtained, the emergency planning zone chosen by the Proponent for the container terminal is equivalent to a radius of 1.3 km around the site. According to the gas dispersion modelling, this distance matches the worst scenario of formation of a toxic cloud of hydrochloric acid or chlorine under daytime conditions. However, the MELCC considers that the emergency measures should cover a zone with a radius of 6.8 km to account for the nighttime scenarios. It also recommends that the emergency preparedness plan be aligned with that of Ville de Québec and Ville de Lévis, because the potential consequences could affect both shores of the river.

Health Canada considers that the Proponent's alert system and the frequent updating of its emergency preparedness plan, including a program of drills with the key stakeholders, would prove to be very important to protect the users of the Baie de Beauport recreational tourism site in case of accidents or malfunctions.

The MELCC considers that the emergency preparedness plan must specifically consider the presence of the Baie de Beauport recreational tourism site, which is exposed in almost every accident simulation. According to the MELCC, it is important to implement an alert system for the users (including sirens) in order to plan the lockdown measures and the evacuation scenarios in case of incidents involving hazardous materials at the terminal facilities, to ensure maintenance of safe access to the recreational tourism zone. It also notes that it has not been demonstrated that the visual and acoustic screen, a wall varying in height from 3 to 8.5 m, can be effective to protect the users of Baie de Beauport in case of an accident.

With respect to the emergency communications plan, Health Canada emphasizes that rapid and effective communication between responders and land users in the event of an environmental emergency is essential to mitigate potential health effects. In the event of a project-related spill that could affect the quality of drinking water sources, close collaboration with the municipal authorities concerned would be necessary to ensure that measures to protect public health are implemented quickly, such as a drinking water advisory. It would be very important that the Proponent's emergency response plan specifically address such a scenario.

The Proponent proposes to have emergency response kits on-site to respond quickly to recover potential contaminants. In the event of a spill, the Proponent would immediately report the situation to the responders identified in the emergency response plan and would also immediately inform Environment and Climate Change Canada's emergency services or the Canadian Coast Guard (in the event of marine pollution). Transport Canada also recommends that employees be familiar with the emergency response plan and be trained in its use.

With respect to road and rail transportation, when there is an accident involving a container, fuel, granular material, machinery or other construction inputs outside the limits of the Port of Québec, it is the responsibility of the carrier and the Ministère des Transports du Québec to have an emergency response plan. This plan ensures the coordination of actions with the local and regional authorities responsible for emergency measures on the territory affected by the Project.

Environment and Climate Change Canada is of the opinion that the protective measures, response protocols and preliminary contingency plans proposed by the Proponent are adequate. They address the types of emergencies that could reasonably be expected to occur, including on-site and off-site consequences, related prevention, alerting and preparedness issues, and corrective and recovery measures.

Environment and Climate Change Canada also recommends considering several elements that have been addressed in the key mitigation measures presented in Subsection 6.1.2.

- The MELCC considers the technological risk assessment satisfactory, subject to the Proponent's commitment to implement the measures required by the MELCC, considering that the individual risk level associated with the Project respects the risk acceptability criterion defined by the MIACC and that in case of a spill in the marine environment, the emergency response would be assured by ECRC, which is present in Quebec, under the responsibility of the Canadian Coast Guard.

6.1.2 Agency Analysis and Conclusions on Residual Effects

Effects Analysis

The Proponent has clearly identified the Project's inherent risks and plans to implement preventive measures, including the proper design of the infrastructure, their inspection and their maintenance (Chapter 2). The Proponent has also presented a preliminary emergency response plan that would enable it to respond quickly and effectively in the event of accidents or malfunctions. Taking into account the mitigation measures (Englobe, 2020r), response measures and contingency plan that the Proponent has committed to put into place, the Agency considers that accidents and malfunctions are unlikely to occur in such a way as to cause significant residual adverse environmental effects on the Project's valued components.

The Agency, based on the opinion of Transport Canada, Environment and Climate Change Canada and the MELCC, considers that the information presented by the Proponent is sufficient and does not raise any particular issues in relation to railway and marine safety. All the operations performed by the Proponent in relation to rail transportation of dangerous goods, i.e., the transportation request, handling or transportation, will have to be performed in accordance with the requirements of the *Transportation of Dangerous Goods Act, 1992* and the *Transportation of Dangerous Goods Regulations*.

Given the mitigation measures (Englobe, 2020r), the response measures and the emergency preparedness plan the Proponent undertook to put into practice, the Agency considers that there is little probability of the occurrence of accidents and malfunctions that would result in adverse residual environmental effects on the valued components of the Project. However, given the public use of the Baie de Beauport recreational site, its proximity to the port operations and the consequences of potential accidents and malfunctions, the Agency considers that the Proponent must plan lockdown measures or evacuation scenarios specific to this site. The Agency also notes that only one land evacuation route exists at present. The Proponent will have to deploy effective means to ensure the users' safety, which account for the site's special peninsular features.

The Agency notes that the Proponent took into account the risks of accidents and malfunctions in the design of the Project in order to prevent risks. Furthermore, the Agency is satisfied with the Proponent's characterization and assessment of potential accidents and malfunctions related to the Project. The Proponent has responded to comments, questions and concerns from government authorities, First Nations and the public.

Determination of Key Mitigation Measures

The Agency considered the mitigation measures proposed by the Proponent and the advice of expert government authorities to identify the key mitigation measures required to ensure that the Project does not cause significant adverse environmental effects in the event of accidents or malfunctions:

General Measures

- Take all reasonable steps to prevent accidents and malfunctions that may cause adverse environmental effects;
- Consult, prior to construction, the Huron-Wendat, Wabanaki, Innu, Mohawk and Maliseet First Nations and the competent authorities on the measures to be implemented to prevent accidents and malfunctions;
- Update, before construction and in consultation with the Huron-Wendat, Abenaki, Innu, Mohawk and Malecite First Nations, as well as the relevant authorities, an accident or malfunction response plan for each phase of the Project. The accident and malfunction response plan shall:
    - Include mapping of the sensitive elements of the environment (in terrestrial and river environments) to guide the responses in case of accident or malfunction. A periodic update of the mapping must be provided to account for any change to the environment and the status of the species.
    - Specify the types of accidents and malfunctions that risk causing adverse environmental effects.
    - Account for the results of the risk assessment associated with the handling and storage of dangerous goods in Classes 2.1 (flammable gases), 2.3 (toxic gases) and 3 (flammable liquids) and determine the safe handling and storage procedures and the control measures to account for sensitive receptors.
    - Provide for an alert system for the users of the Baie de Beauport recreational tourism zone and plan the lockdown measures or evacuation scenarios in case of incidents involving dangerous goods at the terminal facilities, to ensure maintenance of safe access to the recreational tourism zone. The emergency measures must account for the special peninsular features of Baie de Beauport.
    - Determine the necessary equipment to respond to emergencies and localize it to ensure its availability.
    - Provide for training of personnel on maintenance and use of the response equipment.
    - Describe what is planned in case of a spill of hazardous materials to protect the sensitive elements of the environment, including surface water, groundwater and wetlands, fish, migratory birds and other sensitive species.
    - Provide for an emergency planning zone with a radius of 6.8 km to cover all daytime and nighttime scenarios.
- Implement the appropriate measures described in the emergency response plan in the event of an accident or malfunction that could result in adverse environmental effects:
    - Implement the communications plan in relation to accidents and malfunctions;

- Notify the Huron-Wendat, Wabanaki, Innu, Mohawk and Maliseet First Nations as soon as possible, as well as the potentially affected parties and the competent authorities of the accident or malfunction and notify the Agency in writing no later than 24 hours following the accident or malfunction. For the notice to First Nations and the Agency, the Proponent shall specify:
  - The date on which the accident or malfunction occurred;
  - A description of the accident or malfunction;
  - A list of any substances potentially released to the environment as a result of the accident or malfunction.
- Notify appropriate authorities with responsibilities related to emergency response, including environmental emergencies, in accordance with applicable regulatory and legislative requirements.

- Submit a written report to the Agency no later than 30 days after the accident or malfunction. The written report shall include:
  - A description of the accident or malfunction and its adverse environmental effects;
  - The measures that have been taken by the Proponent to mitigate the adverse environmental effects caused by the accident or malfunction;
  - All views of First Nations and advice from the competent authorities received with respect to the accident or malfunction, its adverse environmental effects and the measures taken by the Proponent to mitigate those adverse environmental effects;
  - A description of any residual adverse environmental effects and any additional or modified measures required to be taken by the Proponent to mitigate the residual adverse environmental effects;
  - Details regarding the implementation of the emergency response plan in the event of an accident or malfunction.
- Submit, no later than 90 days after the accident or malfunction, and taking into account the information previously submitted, a written report to the Agency on the changes made to prevent the recurrence of such an accident or malfunction and on the implementation of any modified or additional measures to mitigate and monitor the residual adverse environmental effects and to undertake any required progressive claims. The report includes the views of the Huron-Wendat, Wabanaki, Innu, Mohawk and Maliseet First Nations and potentially affected parties, as well as the views of additional competent authorities received by the Proponent.
- Develop, prior to construction, a communications plan in consultation with the Huron-Wendat, Wabanaki, Innu, Mohawk and Maliseet First Nations and potentially affected parties. Implement and maintain the communications plan during all phases of the Project. The communications plan includes in particular:
  - The types of accidents and malfunctions requiring the Proponent to notify each First Nation and potentially affected parties. The manner in which each First Nation and potentially affected party shall be notified by the Proponent of an accident or malfunction and the opportunities for First Nations and potentially affected parties to assist as a result of the accident or malfunction;
  - The contact information of the Proponent's representatives with whom First Nations and potentially affected parties may communicate and the contact information of the representatives of each of the First Nations and potentially affected parties that the Proponent notifies.

Measures Specific to Rail Transport

- Establish a speed limit for trains at no more than 25 kilometres per hour within the administrative limits of the Québec Port Authority and require that any person respect this speed limit.

Measures Specific to Maritime Transport

- Establish, in consultation with the Laurentian Pilotage Authority, an approach and berthing manoeuvring zone so that any vessel associated with the Project may approach the wharf at reduced speed, subject to navigational safety;
- Indicate, before dredging, the beginning of the dredged area with buoy K168 and keep the buoy in place during all dredging;
- Maintain, during construction and operation, equipment for responding to accidental spills of contaminants in the area of the construction site, including a rapidly deployable floating phase collection device;
- Maintain a fire protection system during construction and operation that meets the technical requirements and operational risks of the Project and is designed by an engineer licensed in Quebec;
- Determine, in consultation with the Laurentian Pilotage Authority, a maximum wind speed for berths and departures that takes into account the sails of vessels associated with the Project, subject to the safety of navigation, and establish a corresponding maximum wind speed at which loading and unloading activities of containers associated with the Project stop.

Measures Specific to Container Management

- Designate the dangerous goods container storage area associated with the Project to allow for the segregation of this area and taking into account the risks associated with existing port operations in the Project area, including the operation of International-Matex Tank Terminals facilities;
- Conduct a visual inspection of containers to verify their condition during handling and loading operations onto trains or trucks and ensure that they comply with safe shipping practices for rail and road transportation;
- Make an inventory, for each dangerous containerized cargo, of the containerized dangerous goods that are stored and transshipped, indicating the maximum quantity authorized to be stored on the premises and the class of dangerous goods according to the *International Maritime Dangerous Goods Code*.

6.2 Effects of the Environment on the Project

Pursuant to paragraph 19(1)h) of CEAA 2012, the environmental assessment must consider the effects that the environment may have on the Project, including the effects of local conditions, earthquakes and extreme weather events, whether or not related to climate change.

6.2.1 Analysis of Potential Effects and Proposed Mitigation Measures

The Proponent assessed several environmental factors that could have an effect on the Project, including geological conditions, hydrodynamic conditions, extreme weather events and climate change. According to the Proponent, the Project's technical design considers all identified risks and safety factors through the choice of equipment types and materials and the implementation of best practices.

Potential Effects of Geological Conditions

The potential effects of geological conditions assessed by the Proponent include risks associated with seismic activity, potential soil liquefaction associated with earthquakes, ground movements, subsidence, settlement and landslides.

The seismic risk in the Québec City area is low to medium. The Proponent used the design standard of the Canadian Highway Bridge Design Code (CAN/CSA-S6-14) to account for seismic risk in the design of port and marine structures (Englobe, 2020b). Future installation of structures in the area behind the wharf must also use and respect the current design standard.

During the environmental analysis, Natural Resources Canada raised concerns about the potential for liquefaction and lateral spread landslides due to earthquakes. In response to the Agency's questions (Englobe, 2020b), the Proponent provided the required information and demonstrated that these risks were taken into account in the analysis, site preparation (soil compaction in the area behind the wharf and soil excavation) and infrastructure design. Natural Resources Canada is satisfied with the information provided by the Proponent.

Thus, for lateral spread landslides to occur, granular soils would have to liquefy completely or partially. For this Project, geotechnical tests reveal liquefaction potential only at great depths of 30 metres (Englobe, 2020b). The impacts of liquefaction would be negligible at the surface and would not pose a threat to Project installations (Englobe, 2018d). For the development of the area behind the wharf, existing design standards would be used and the foundations of these structures would be designed to counter any risk of liquefaction in the upper part of the backfill. The Proponent points out that only the riverbed would be affected locally as a result of a major earthquake-induced landslide. In the case of spread issues following soil liquefaction, dredging would allow the necessary adjustments to be made. The Proponent does not propose any mitigation measures to reduce these risks since they would be taken into account in the site preparation and design of marine and land-based infrastructures, which would take into account the most recent versions of construction standards related to the Project, including the Canadian Building Code.

As for ground movement, subsidence and settlement, the Proponent has considered the settlement that would occur in the short term due to the caissons' weight and has factored this into their design. This settlement would nevertheless be negligible. No further ground movement or settlement is expected due to soil stability (Englobe, 2018d). The Proponent expects that ground movement or subsidence will have limited effects on the new wharf. Resistance to landslides has been incorporated into the design of the caissons,

based on the applicable parameters and safety factors, to withstand the various loads to which they will be subjected. To protect against scouring and to maximize the lifespan of wharf 54, slabs would be installed at the foot of its facade. Other measures to control the effects of settlement would be validated during the detailed engineering phase.

In general, Natural Resources Canada believes that the Proponent has adequately identified and documented the changes and risks related to seismic activity. It recommends that appropriate measures (dynamic compaction or the installation of vibro stone columns) to be implemented in areas backfilled with materials that are sandy or likely to liquefy in the event of an earthquake. The impact of earthquakes on the caissons should also be assessed during the detailed engineering phase. The Agency has forwarded these recommendations to the Proponent.

Potential Effects of Hydrodynamic Conditions

To address the effects of hydrodynamic conditions on the Project, the Proponent examined hydraulic conditions, high tides, storm surges and ice cover.

The hydraulic conditions of the Saint-Charles River are regulated by the Joseph-Samson Dam, which is located at its mouth. The Québec City has been studying this dam for several years as part of the Project *Gestion des sédiments et contrôle des niveaux d'eau en amont du barrage Joseph-Samson sur la rivière Saint-Charles* [Sediment management and water level control upstream of the Joseph-Samson Dam on the Saint-Charles River]. According to the Proponent, the Québec City is in contact with the Québec Port Authority to ensure that the potential effects of the hydrodynamic conditions on the Laurentia Project area are assessed and that the Joseph-Samson Dam Project is adjusted accordingly (Englobe, 2018d).

High tides and storm surges could combine to create turbulent water conditions that could pose a risk during the construction and operational phases (Englobe, 2018d). During the operational phase, waves from high tides and storms could also endanger the berthing and loading of vessels. The Proponent maintains that these are existing conditions that are taken into account in their current operations. According to the Proponent, these risks are also taken into account in the design of the structures, particularly through the selection of the concrete to be used, which would have a high compressive strength and would contain additives to increase its durability (Englobe, 2018d).

During the construction phase, no work is planned during the winter season. Thus, the presence or movement of the ice cover would not affect the Project's completion (Englobe, 2018d). However, during the operational phase, ice could be hazardous for berthing and ship loading and may slow down operations. Because of its design and construction materials, the wharf would be able to withstand the structural load caused by ice accumulation and movement. The orientation of the new wharf, which is 17 degrees north of the range line of wharf 53, was chosen to facilitate the flow of water and ice floes (Englobe, 2020a).

Potential Effects of Extreme Weather Events and Climate Change

The Proponent's assessment of the potential effects of extreme weather events includes cold waves, winter storms, floods, droughts, heavy precipitation, severe thunderstorms and tornadoes. During the construction and operational phase, extreme weather events could affect port operations and result in a temporary cessation of activities (Englobe, 2018d). The Proponent is aware of these conditions and has taken them into account in its current operations and in the design of the proposed installations, including that of the storm drainage system.

The Proponent has taken climate change into account in its projections of heat waves, maximum temperatures, drought periods and ice movement. Climate change would not have an impact on the Project since it was taken into consideration in the Project's design and ongoing operations, particularly by ensuring the wharf's resistance to ice and by conducting mooring simulations according to water levels during periods of drought (Englobe, 2018d). During the lowering of the river level due to severe drought, the Proponent has projected a water depth of 16 metres at low tide in the manoeuvring and mooring area, and does not expect the Project to be affected. Rising sea levels, recurrence of extreme events, wave heights and high tides are concerns raised by the public.

6.2.2 Agency Analysis and Conclusions on Residual Effects

Analysis of the Effects

The Agency agrees that the Proponent has taken into account the environmental factors that could have an impact on the Project's design of land-based and marine infrastructures and on the terminal's day-to-day operations.

6.3 Cumulative Environmental Effects

Cumulative environmental effects are defined as the effects of a project that are likely to occur when a residual effect act in combination with the effects of other projects or activities that will be or have been carried out. The Agency's Operational Policy Statement guided the cumulative effects assessment[55]. To determine the components to be subject to a cumulative effects analysis, the Agency based its assessment on the significance of the residual adverse effects, the likelihood of their occurrence, the degree of concern expressed by the public, the First Nations consulted and the government authorities, and the state or condition of the valued component.

[55] Cumulative Environmental Effects Assessment under the *Canadian Environmental Assessment Act, 2012.*

Thus, for this Project, the Agency focused its analysis on the following five components:

- Fish and fish habitat;
- The current use of lands and resources for traditional purposes by Indigenous Peoples;
- Socio-economic conditions;
- Air quality;
- Human health.

Based on its analysis, the Agency concludes that the Project, in combination with past, present and reasonably foreseeable future projects, is likely to cause significant cumulative effects on all of the above components, despite the implementation of additional mitigation or follow-up measures. In reaching this conclusion, the Agency considered the Project's effects, the effects of other projects or physical activities, the views expressed by federal and provincial departments, Indigenous communities and the public, and proposed mitigation measures.

6.3.1 Proponent's Methodological Approach and Scope

The Proponent conducted a cumulative effects assessment based on the guidelines described in the Agency's Operational Policy Statement[1]. The Proponent also relied on the methodology described in the Practitioners Guide prepared by Hegmann et al. (1999) to analyze the cumulative effects of its Project. The Proponent's approach to cumulative effects assessment is based on five steps (Englobe, 2018d):

- Determining the scope of the cumulative effects analysis, including: the determination of spatial and temporal boundaries; the determination of the valued components; a review of concrete activities carried out in the past; a review of the concrete activities that will be carried out;
- Analysis of cumulative effects;
- Assessing the significance of cumulative effects;
- Identification of mitigation measures;
- Cumulative effects monitoring.

The Proponent's selection of valued components for the cumulative effects assessment was based on the following:

- The valued components listed in the Agency Statement Guidelines as well as the April 24, 2017 information request;
- Valued components other than those listed in the guidelines for which environmental effects will persist after mitigation measures are implemented;
- Stakeholder concerns gathered during public consultation and information activities.
- The Proponent selected the following valued components: air quality; water quality; terrestrial environments and vegetation; wetlands, riparian and aquatic vegetation; terrestrial wildlife and their habitats; aquatic wildlife and their habitats; birds and bird habitat; species at risk and their habitats;

designated environmentally sensitive areas; nighttime light intensity; land use and resources; public safety; and the visual environment.

The Proponent established spatial boundaries for the cumulative effects assessment based on the components analyzed.

The Agency focused its analysis of cumulative effects on fish and fish habitat; current use of lands and resources for traditional purposes by First Nations; socio-economic conditions; air quality; and human health. In selecting valued components, the Agency considered the potential significance of cumulative environmental effects and the likelihood of their occurrence, the level of concern expressed by consulted First Nations, the public and government experts, and the state or condition of the valued component. The Agency excluded the other valued components from its cumulative effects analysis given the absence or low intensity of anticipated residual effects on these components and the fact that these effects are unlikely to be cumulative with other past, present or reasonably foreseeable projects in the Project area.

In conducting the cumulative effects assessment, the Agency considered information gathered by the Proponent, the effects of the Project, the effects of other projects and activities, the views expressed by government experts, First Nations and the public, as well as the application of proposed mitigation and follow-up measures and existing federal and provincial regulatory regimes. Table 16 presents the spatial and temporal boundaries established by the Proponent for the valued components selected by the Agency.

The past time limit (1927) established by the Proponent corresponds to the construction of the Anglo Canadian Pulp and Paper (White Birch) mill. This period marks the beginning of the industrial revolution and the beginning of the development of industrial-type port infrastructures at the Port of Québec. The future limit (2026) corresponds to the last year of the St. Lawrence Centre follow-up program (2026).

The Proponent chooses several past works and events for the analysis of cumulative effects, including the construction of wharves 50 and 51 and the development of a cruise terminal; the dredging of sediments at the mouth of the Saint-Charles River in 1960; the construction of Champlain Boulevard; the construction of the Joseph-Samson Dam at the mouth of the Saint-Charles River (1963); the construction of the Dufferin-Montmorency Highway; the development of the Samuel-de-Champlain Parkway and other developments by public authorities (federal, provincial and municipal) that have had an impact on aquatic habitats.

Table 17: Spatial and Temporal Boundaries Used by the Proponent for the Assessment of Cumulative Effects on Selected Components

Valued Component – Cumulative Effects	Spatial Boundaries	Time limits
Fish and fish habitat	St. Lawrence River Corridor between Montréal and Île d'Orléans	1927 à 2026
Indigenous Peoples – Current and Traditional Uses of Land and Resources	Addressed in a global way, without specific spatial or temporal limits	
Air Quality	Airshed area	Urban development of the region
Human Health	Airshed area	Urban development of the region

6.3.2 Fish and Fish Habitat, Including Invertebrates

The Agency focused the analysis of cumulative effects on the migratory fish species most severely affected by the Project, namely striped bass, lake sturgeon, Atlantic sturgeon and American shad, as well as mussels species at risk, including the olive hickorynut, a species at risk.

Analysis of Cumulative Environmental Effects and Mitigation and Monitoring Measures by the Proponent

Analysis of Cumulative Effects on Habitat

According to the Proponent, the St. Lawrence River ecosystem has undergone several disruptions and modifications over time, notably due to urban development on its shores. Among these, the channelization of the St. Lawrence River as well as the dredging of the Seaway and its maintenance have significantly modified the St. Lawrence River ecosystem. Artificialization of the banks by man-made developments (wharves, walls, backfilling, rock placement) have also contributed to the fragmentation of the natural riparian environment (Englobe, 2020h).

According to the Proponent's estimate, the area covered by aquatic habitat in the port sector was estimated at 614 hectares in the 1960s. Since that time, the loss of aquatic habitats (wetlands and permanent aquatic areas) due to dredging, backfilling and the installation of port and road infrastructures is estimated at 239 hectares. The current area covered by the aquatic environment in the construction zone is estimated at 375 hectares. Thus, nearly 39% of the aquatic habitats in this sector would have been lost in the Beauport Bay area in nearly 60 years. The Project will add the destruction of 12.8 hectares and the permanent modification of 8.6 hectares of aquatic habitats, representing an additional 5.6 and 19.1% respectively (Englobe, 2020h).

The Proponent considers that the quality of the habitats lost at the end of the harbour tip in the context of this Project is different from that of the original shoreline habitats of the Beauport Bay. A wide, shallow tidal flat with significant riparian and submerged aquatic grass beds characterizes the latter. The Proponent believes that the Project's footprint and dredging area consist of medium-quality feeding habitat for fish. According to the Proponent, the most significant effects on fish habitat were caused by the backfilling of the riparian portion of the Beauport Bay, which included a tidal flat of emergent and submerged aquatic grass beds. He concluded that this loss had a much greater effect on fish productivity than his Project could have. He therefore considers that the Project's residual cumulative effect on fish habitat are not significant (Englobe, 2020h).

Cumulative Effects on Fish

The Proponent's analysis focuses particularly on species at risk (American shad, striped bass, lake sturgeon, and Atlantic sturgeon) since these species, as well as their habitats, located in the Project area are currently weakened by human activities. The construction of new port infrastructure, as well as the increase in port activities and the realization of future projects, are likely to increase the current pressure on these species (Englobe, 2020h).

American Shad

The Proponent reports that the decline of the American shad population in the river is linked to the various dams impeding access to spawning sites for spawners. Since the Proponent considers that there are no spawning grounds at the Beauport site, it concludes that the cumulative effects of successive fillings in Beauport Bay probably had no impact on the reproduction of this species. However, Beauport Bay is now a rearing and nursery habitat for the young of the year, he believes that the reduction of the bay's natural riparian habitats following successive fillings probably had a significant effect on the productivity of the young of the year. New habitat destruction would add to historical losses and could constitute a significant cumulative effect. However, it notes that riparian habitats for young shad are relatively abundant along the shores of the St. Lawrence River, particularly around Île d'Orléans, and that the American shad population would only be incidentally affected by the Project.

The Proponent does not propose any additional measures to mitigate cumulative effects on American shad, and considers that some of the proposed developments under the Fish Habitat Offset Project would increase the amount of rearing habitat for young of the year fish.

Striped Bass

The Proponent reports that the species' historical decline was probably due to disturbance generated by the deposition of dredged material within important habitats, which would have forced the bass to take refuge in areas of the river where intensive fishing activities were taking place.

Today, the abundant and regular presence of striped bass in Beauport Bay and in front of the port peninsula demonstrates, according to the Proponent, that the species easily adapts to heavily modified environments. Thus, it does not anticipate that the Project's effects on striped bass reproduction would add up to historical and future cumulative effects.

According to the Proponent, it is likely that the successive fillings that have reduced riparian habitats in Beauport Bay have had a significant effect on the availability of feeding habitat for the young of the year fish. The Proponent considers that the habitat loss induced by the Project would add to the loss of historical habitats in Beauport Bay and could constitute a significant cumulative effect. However, he points out that riparian habitats for young striped bass are relatively abundant along the shores of the St. Lawrence River and that the striped bass population would only be incidentally affected by the Project.

The Proponent is not proposing any additional mitigation measures for the striped bass, but considers that some of the developments proposed as part of the fish habitat offset project would increase rearing habitat area for young of the year striped bass.

Lake Sturgeon

The Proponent reports that human activity is the main threat to lake sturgeon. Historically, commercial fishing has caused massive declines in many lake sturgeon populations. More recently, direct and indirect effects of dams have been identified as a threat for this species.

Sturgeon using the study area are also likely to use the habitats of the St. Lawrence River between Île d'Orléans and the upstream part of the Montréal archipelago. The Proponent hypothesizes that lake sturgeon used Beauport Bay and the St. Charles River estuary as feeding habitat in the past. It considers that the Project’s cumulative effect on this species would not be significant since the Project would have no noticeable impact on its feeding habitat.

The Proponent does not propose any additional mitigation measures for lake sturgeon.

Atlantic Sturgeon

The Proponent reports that the main threats to Atlantic sturgeon are commercial fishing and habitat degradation and loss. The modification of benthic environments related to dredging activities would constitute a significant threat, mainly in the feeding area for juveniles. The Proponent states that water quality near spawning grounds contains high levels of phosphorus and suspended solids due to increased flow and the resulting erosion (Comité de concertation Suivi de l'état du Saint-Laurent, 2008). Such an increase in bank erosion could lead to the deposition of suspended solids on spawning grounds and the asphyxiation of incubating eggs.

According to the Proponent, juvenile Atlantic sturgeon feed in relatively deep zones (between 10 and 40 metres) in the study area and the cumulative effects of the loss of riparian habitat in the Beauport Bay are probably not significant for this species. From the Proponent perspective, the Project's footprint is located in an area that is barely used by Atlantic sturgeon and the dredging area is located near an

area where juvenile sturgeon are concentrated. For the Proponent, the effects of dredging on this species would not be significant as long as future depth and substrate conditions are adequate. The Atlantic sturgeon using the study area are likely to use the river habitats located between Trois-Rivières and the Gulf of St. Lawrence. The Proponent concludes that the cumulative effects of the Project are not significant.

The Proponent does not propose any additional mitigation measures for Atlantic sturgeon.

Cumulative Effects on Freshwater Mussels

According to the documentation consulted by the Proponent, the mussels population fell dramatically between 1995 and 2005. Several species are currently in a precarious situation. The main causes associated with this decline are the construction of dams and dikes that modify the chemical and physical properties of the water upstream and downstream, water pollution and the introduction of invasive alien species, such as the zebra mussel. Moreover, the Proponent indicates that this species' density in Beauport Bay far exceeds that of native species. It should be noted that the 205 hectares of encroachment and dredging carried out since the early 1960s constitute a habitat loss for this community of organisms.

The Proponent considers that the construction and operation of the new port infrastructures constitute disruptive elements whose effects on the mussels will add to those generated by past and current activities. It also indicates that the risk of contamination of the mussels population by ships' ballast water (the main vector for invasive alien species) will be accentuated by changes to ships' transit and by ships' greater capacity, involving larger ballast water volumes. Thus, the Proponent concludes that there are significant cumulative effects, notably because current information tends to show that the mussels population is in sharp decline.

As additional mitigation measures to reduce the Project's cumulative effects on mussels, the Proponent proposes to inspect dredges and other watercraft used in the aquatic environment prior to their arrival at the construction site to ensure that they are free of invasive alien species.

Agency Analysis

For fish and fish habitat, the spatial boundaries considered by the Agency in its analysis include the range of fish species affected by the Project in the St. Lawrence River. The Agency relies on the advice of Fisheries and Oceans Canada, which considers that the cumulative effects analysis carried out by the Proponent did not sufficiently take into account the habitat needs of sensitive species and did not demonstrate that the residual habitats were sufficient to support the targeted fish populations. However, the Agency is satisfied with the Proponent's analysis of cumulative effects on special status mussels.

The Agency notes that approximately 39% of the aquatic habitats in Beauport Bay have been lost in nearly 60 years. Although the residual habitats that would be lost because of the Project are of small scale, Fisheries and Oceans Canada considers that they still support important fish habitat functions and that they are used intensively by sensitive and highly prized fish species.

The environment in which the Project is located is particularly sensitive, complex and rare in this sector of the St. Lawrence River and provides a full set of fish habitat functions. Thus, the Project's habitat losses may have cumulative consequences on the numbers of species by eliminating important habitats. These species have already experienced several pressures and their populations are fragile. In addition to the threats identified by the Proponent, the *Species at Risk Public Registry* targets dredging activities as an additional danger to striped bass. According to the Registry, infrastructure development, disturbance of riparian habitats, contamination, the installation of obstacles and invasive alien species could also hinder the survival and recovery of the species in the St. Lawrence River.

The Agency believes that the preservation of these habitats is important, even essential, for the conservation and recovery of these sensitive species. In this context, the Agency concludes that carrying out the Project would expose the residual habitats to additional and cumulative pressures on fish populations (many of which are sensitive) that depend on the Beauport site to carry out certain key stages of their life cycle.

Agency's Conclusion

The Agency considers that the Project, in combination with past, present and reasonably foreseeable projects, is likely to cause significant cumulative effects on fish and fish habitat, specifically on striped bass, lake sturgeon, Atlantic sturgeon, and American shad in the St. Lawrence River.

The Agency considers that the following additional mitigation measure would reduce cumulative effects on mussels:

- Inspect dredges and other watercraft used in the aquatic environment prior to their arrival at the work site to ensure that they are free of invasive alien species.

However, as with the Project's direct effects on fish and fish habitat, the Agency considers that the key measures identified in Section 5.4 would not sufficiently mitigate the Project's potential effects to ensure that the cumulative effects are not significant.

6.3.3 Current Uses of Lands and Resources for Traditional Purposes

Considering the Project's potential effects on fish species prized by First Nations, the Agency focused its analysis on the cumulative effects on the current use of lands and resources for traditional purposes on fishing activities carried out by First Nations. The First Nations likely to be affected are the Huron-Wendat and W8banaki Nations, the Essipit, Pekuakamiulnuatsh and Pessamit Innu First Nations, the Kahnawà:ke Mohawk First Nation and the Wolastoqiyik (Maliseet) Wahsipekuk First Nation. For the two Mohawk First Nations of Kanesatake and Akwesasne, the Agency does not have information regarding the current use of lands and resources for traditional purposes by their members.

Analysis of Cumulative Environmental Effects and Mitigation and Monitoring Measures Proposed by the Proponent

The Proponent conducted an analysis of the cumulative effects of port activities and marine transportation on the Indigenous human environment with respect to the availability of resources, access to territory and resources, and the quality of the experience. The Proponent concluded that the Project would have no cumulative effects on fishing since it considers that the cumulative effects on fish would be minor and that the effects on Indigenous fishing would not be perceptible to First Nations members (Englobe, 2020f). However, he indicates that it is undeniable that past activities and events have limited the use of the territory and resources by Indigenous people. Urban, agricultural and industrial development, as well as activities related to maritime transportation, the privatization of riverbanks and the discharge of wastewater into the river are among the main factors responsible for this situation (Englobe, 2020h). These past activities and projects would also have significantly restricted First Nations member's access to the St. Lawrence River for many decades (Englobe, 2020h).

All of the communities that participated in the environmental assessment indicated that they have concerns about the increase in navigation on the St. Lawrence River due to the various port expansion projects currently underway or under assessment. The Proponent mentioned that this increase could have consequences on fishing practices and more specifically on the experience of the members. It could also imply a loss of peaceful enjoyment of the territory for users of the water body and induce a perception of increased disturbance of the territory (Englobe, 2020h). Therefore, this factor could diminish the quality of the fishing experience by First Nations members. This quality of experience could continue to deteriorate if the number of vessels were to increase in connection with other harbour projects. For the Mohawk Council of Kahnawà:ke, each additional passage of a vessel near the community represents a significant disruption in the activities of First Nation members (Englobe, 2020h).

The Proponent does no plan any specific mitigation measures in relation to cumulative effects on current uses of lands and resources for traditional purposes. The Proponent suggested that he could organize discussions on cumulative effects with First Nations, if they wish so. In the event that specific issues or problems are raised in relation to cumulative effects, mitigation or offsetting measures could, if necessary, be identified and implemented.

Agency’s Analysis

The Proponent did not define a clear spatial and temporal limit in the analysis for the cumulative effects of port activities and marine transportation on the Indigenous human environment. For the purposes of the analysis, the Agency determined that the limits would be the same as those used for the analysis of the cumulative effects of the Project on fish and fish habitat, particularly because fishing practices are fundamentally linked to the state of the resource. The Agency’s assessment is based on the analysis and conclusions in the sections on direct effects of the Project on fish and fish habitats (Section 5.4) and on current uses of lands and resources for traditional purposes (Section 5.9), as well as the subsection on cumulative effects on fish and fish habitat (Subsection 6.3.2).

The First Nations who participated in the environmental assessment testify to the impacts of the modifications to the St. Lawrence River ecosystem on the practice of their fishery. Several mentioned that the decline in the numbers of prized populations such as striped bass, lake sturgeon, Atlantic sturgeon and American shad have had consequences on the fishing carried out by their members, but also on the customs surrounding these fisheries. These changes have forced fishermen to turn to other available species or to move to continue fishing for species usually prized. The striped bass fishery is a good example. This fishery, once practised and prized by most First Nations using the St. Lawrence River, is now no longer carried out by the majority of community members in order to allow the species to recover.

For the Grand Council of the W8banaki Nation, fish populations in the river have been under significant pressure in the past and are now in decline. According to the Grand Council, human activity, including ecosystem modification related to channel (seaway) dredging, bank anthropization, dam and lock construction, the introduction of alien species and water pollution from municipal, industrial and agricultural sources are factors responsible for this decline. The Grand Council of the W8banaki Nation gives the example of four important fish species whose stocks have experienced significant declines related to the cumulative effects of different projects or activities: lake sturgeon, Atlantic sturgeon, striped bass and yellow perch. It also pointed out that the Nation is faced with a decline in the populations of the species it has fallen back on, notably yellow perch in Lake Saint-Pierre. This species is now subject to a moratorium until 2022[56] in Lake Saint-Pierre. The lake's capacity to support a yellow perch population has decreased considerably due to the loss and deterioration of habitats caused by human use of the shoreline.

With respect to the quality of the fishing experience and the availability of the resource, the Grand Council of the W8banaki Nation also points out that its members must fish in increasingly difficult and stressful contexts. Innu First Nations also mentioned that for their members living off-reserve, access to any form of practice is increasingly difficult. For those living near Québec City, the Beauport Bay site is one of the last places that still allows access to the river and its shores to practise their traditional practices or simply to enjoy nature and live the experience and contact with this important area for the Innu.

According to the Mohawk Council of Kahnawà:ke, the Project would affect migratory species in the river and, consequently, traditional fishing activities. It insists that the community cannot accept a further decline in fish populations.

The Agency believes that, for all communities, the sense of tranquility and escape, the transfer of knowledge and the collective and individual health supported by the food, ritual and social practices related to fishing are affected by the cumulative effects of past and present activities and projects.

As for future projects, the redevelopment and expansion of the cruise terminal, the redevelopment of the Bassin Louise, sediment management at the Jacques-Samson Dam, the construction of the Île d'Orléans Bridge and the redevelopment, expansion and use of the Ross-Gaudreault cruise terminal could have significant cumulative effects on fish populations already threatened by the Project and thus have consequences on First Nations fisheries throughout the river corridor. Furthermore, since the affected fish

[56] https://mffp.gouv.qc.ca/la-faune/peche/prolongation-moratoire-perchaude/

populations are migratory, other development projects along their migration corridor on the St. Lawrence River could add cumulative effects on these populations, notably the expansion projects of the ports of Montréal and Trois-Rivières.

Agency's Conclusion

The Agency considers that the Project, in combination with past, present and reasonably foreseeable projects, is likely to cause significant cumulative adverse environmental effects on the striped bass, lake sturgeon, Atlantic Sturgeon and American shad fishing carried out by First Nations, as well as on the traditions or customs surrounding these activities. The Project's effects on species of interest fished by First Nations would be significant as the stocks are already low. Thus, any additional effects of future projects would exacerbate the threats to these species, which could lead to significant cumulative effects on the already diminished Indigenous fisheries.

Based on the analysis of the effects on fish and fish habitat (Section 5.4), the Agency considers that no mitigation, monitoring or follow-up measures would sufficiently reduce the cumulative effects of the Project on the practice of fishing and the activities and customs surrounding this practice to ensure that the cumulative effects are not significant.

6.3.4 Socio-economic Conditions

The Agency focused its analysis on issues related to recreational and commercial fishing because of the Project's potential significative effects on the distribution and abundance of popular migratory fish species, including lake sturgeon, Atlantic sturgeon and American shad. The possible return of the striped bass fishery is also being considered, since this species is the subject of a recovery strategy in the St. Lawrence River.

Analysis of Cumulative Environmental Effects and Mitigation and Monitoring Measures Proposed by the Proponent

Socio-economic conditions, including recreational and commercial fishing, were not included in the Proponent's cumulative effects assessment. The Proponent justifies its choice by explaining that the Project was designed in such a way as to avoid conflicts of use and changes to the zoning of the targeted sites. He also indicated that 0.4 hectares of recreational land would be available as a result of the Project's realization and with the development of the Baie de Beauport, which would benefit recreational activities.

Agency's Analysis

The Agency determined that the spatio-temporal limits would be the same as those used for the analysis of the cumulative effects of the Project on fish and fish habitat, in particular because fishing practices are fundamentally linked to the state of the resource. The Agency's analysis is based on the analysis and conclusions of the sections on direct effects of the Project on fish and fish habitat (Section 5.4) and socio-economic conditions (Section 5.8), as well as the subsection on cumulative effects on fish and fish habitat (Subsection 6.3.2). In addition, the analysis of cumulative effects on Indigenous fisheries described in

Subsection 6.3.3 also applies to recreational and commercial fishing by the general population, since the effects are related to the same fish species.

As indicated in Section 5.8, recreational fishing is an important activity for the economy of Quebec and Canada. In 2016, 5,077 jobs were created or maintained in Quebec by activities related to fishing. For the year 2015, current expenditures (packages, transportation costs, food and lodging, fishing services, etc.) and expenditures on durable goods (boats, special vehicles, fishing equipment, etc.) by recreational fishers contributed $473 million to the province's gross domestic product (B.E.S.T.E., 2020). According to Mingelbier (2016), approximately 10% of recreational fishers in Quebec fish on the St. Lawrence River. Due to the diversity of fish species present and the proximity of major urban centres, recreational fishing on the St. Lawrence River has a strong potential for development (Mingelbier et al., 2016).

Sturgeons have been fished commercially in the St. Lawrence River for over a century. Although the St. Lawrence River remains one of the few rivers in North America with a population healthy enough to support a commercial fishery, the lake sturgeon remains vulnerable because of the particularities of its life cycle. As for the Atlantic sturgeon, which almost disappeared in 1970, the effectiveness of the management programs that have been implemented for the species now allows for the issuance of commercial fishing licences. A recent review of the use of Atlantic sturgeon in the St. Lawrence Estuary nevertheless concludes that the population is currently overexploited. American shad is a species in a precarious situation designated as vulnerable under the *Act respecting threatened or vulnerable species*. In the 19th century, this species was one of the three most exploited fish species on the Atlantic coast. However, commercial landings of American shad in the St. Lawrence River have been significantly reduced since the mid-20th century (Gagnon-Poiré *et al*., 2020). The declines are believed to be due to overfishing and habitat loss, including loss of connectivity due to dam construction and pollution that has reduced dissolved oxygen concentrations. This species is the subject of a recovery action plan involving many agencies and departments. In recent years, there has been a significant interest in the recreational fishery for this species (Gagnon-Poiré *et al*., 2020).

Recreational and commercial fishing for striped bass, a species that disappeared from the river in the 1960s and was reintroduced in 2002, is not authorized because of its endangered status under the *Species at Risk Act*. Significant investments have been put in place by the governments of Quebec and Canada since 2002 to reintroduce the species and eventually allow the resumption of sport fishing. According to the proposed recovery strategy and action plan for striped bass (DFO, 2019), a survey of the sport fishery in the Gaspé Peninsula conducted in 2015 estimated the economic benefits of this new fishery to be at least $1 million in its second year of existence. If the striped bass recovery were to allow the return of a sport fishery in the St. Lawrence Estuary, certain regions could benefit from significant socio-economic benefits.

The Agency concluded that there would be significant adverse residual effects on socio-economic conditions related to recreational and commercial fishing since the Project would alter the distribution and abundance of fish species. As well, any adverse effects on these fisheries resulting from present or future activities would be cumulative with and exacerbate the residual effects of the Project. The main threats to prized and migratory fish species come notably from dams that prevent them from migrating to habitats essential to their life cycle and from the loss of habitat, particularly breeding habitats. Any project having such effects would necessarily have consequences on commercial and recreational fisheries that would add to the significant effect generated by the Project on fish and fishing.

Thus, given these potential effects, the impossibility of offsetting for certain habitats and the great difficulty of offsetting for others, particularly for the two species of sturgeon, striped bass and American shad, the Agency considers that the Project could cause changes in the practice of recreational and commercial fishing. For example, the overall performance of recreational fishing in the river, which can be considered a lucrative recreational activity in Quebec (Mingelbier et al., 2016), could be affected by a decrease or changes in the stock of certain fish species. Fishermen would turn to other species or move to continue fishing the usually prized species. Cumulative impacts on recreational and commercial fisheries would occur throughout the river corridor due to the migratory nature of the prized species. Significant investments in the recovery of these species could also be lost.

Agency's Conclusion

The Agency considers that the Project, in combination with past, present and reasonably foreseeable projects, is likely to cause significant cumulative adverse environmental effects on recreational and commercial fishing, particularly for prized species such as lake sturgeon, Atlantic sturgeon and American shad, as well as the potential return of striped bass fishing to the St. Lawrence River.

Based on the analysis conducted on fish and fish habitat (Section 5.4) as well as socio-economic conditions (Section 5.8), the Agency considers that no mitigation, monitoring or follow-up measures would sufficiently reduce the Project's cumulative effects on recreational and commercial fishing to ensure that they are not significant.

6.3.5 Air Quality

Analysis of Cumulative Environmental Effects and Mitigation and Monitoring Measures Proposed by the Proponent

According to the Proponent, the implementation of past projects has generated cumulative effects on air quality within the spatial boundaries selected for the analysis of this component. Other current and future projects, including those related to the construction and maintenance of roads and highways, infrastructure rehabilitation, bridge and incinerator construction, are also likely to modify the overall air quality situation.

For all these projects, air quality is affected by gaseous emissions, such as exhaust and fuel combustion from road, rail and marine vehicles, dust generation and air emissions from factory or industrial stacks. The operation of White Birch Paper's Stadacona mill, the Québec City incinerator and the Port of Québec current operations are examples of activities described by the Proponent that affect current air quality (Englobe, 2020c).

The Agency considers that other sources contribute to the current state of air quality, particularly residential wood heating. To this end, Québec City will prohibit on its territory, as of September 1, 2026, fuel-burning appliances that do not have CSA57 or EPA58 certification. This regulation aims to control the emission of fine particles, particularly $PM_{2.5}$, from solid fuel heating appliances. However, wood-burning fireplaces, pellet stoves and cooking stoves are excluded from this regulation. A subsidy program accompanies this regulation to encourage the removal or replacement of non-certified appliances. With this program and regulation, the baseline condition could gradually improve in the years following its implementation (2026). According to Government of Quebec experts, however, it is difficult to anticipate and quantify the actual decrease in fine particle concentrations that could result and to take this into account in the Project assessment.

Furthermore, concentrations of total suspended particulate matter (TSP) resulting largely from wind erosion and resuspension of particulate matter remain higher in the summer than in the winter, according to the report on the incinerator and air quality in the borough of La Cité-Limoilou of Québec City (Walsh, P. and J.-F. Brière, 2018).

Future projects include the construction and operation of a biomethanization centre, the construction of a new bridge for Île d'Orléans, a third road link between Québec City and Lévis, a structuring transportation network and various road projects, as well as the redevelopment of the Bassin Louise, the Promenade portuaire du Foulon and the Promenade Samuel de Champlain (Phases III and IV). According to the Proponent, these projects would emit atmospheric contaminants from similar sources. In fact, they consist mainly of excavation and grading work requiring machinery and trucking for the supply of materials and resulting in the emission of dust and greenhouse gases. The duration of the construction phase for these projects is variable, but would be limited to a few years. As for their operational phase, some would result in an increase in traffic on the roadways (e.g., various road projects, third road link), while others would reduce the pressure on the road network (e.g., tramway). The main air emissions associated with the operational phase of these projects would therefore be dust generation, fuel combustion and exhaust emissions (Englobe, 2020c).

Finally, the Proponent considers that the cumulative effects due to marine activities would not be significant and that carrying out the Project would help avoid a significant increase in contaminant emissions from larger scale trucking in the future. The Proponent justifies this hypothesis by suggesting that, without the Laurentia Project, containers from the local market would necessarily have to pass through another port in Quebec or elsewhere in Canada or the United States and that their transportation to Québec City (particularly trucking) would generate emissions that could be avoided or reduced by the Laurentia Project (Englobe, 2020c). Environment and Climate Change Canada considers this assertion hypothetical, and it would be valid only if the future conditions described by the Proponent were to materialize. Rather, it asserts that the Project would result in an increase in marine and rail traffic in absolute terms in the airshed area. A decrease in the air quality effects in this area would therefore not be felt by this likely change in freight traffic.

[57] CSA: Abbreviation for Canadian Standards Association

[58] EPA: Abbreviation for United States Environmental Protection Agency

With respect to rail transportation in the operational phase, no significant cumulative effect on air quality is anticipated. According to the Proponent, the number of locomotives on the network is not expected to increase despite the Project's completion.

The Proponent puts into perspective the magnitude of the Project's effects in relation to other activities currently underway that influence air quality in the airshed area. The Proponent identifies current ambient air quality as the main aggravating factor in the cumulative effects assessment. On this point, Health Canada, Environment and Climate Change Canada, MELCC, some First Nations, l'Association des médecins pour l'environnement, several environmental groups, citizens' groups, and municipal and provincial elected officials consider that improving air quality in the inner city requires a significant reduction in emissions from existing activities adjacent to the port. Some recommend that dry bulk transshipment activities be greatly improved or even eliminated from the area. The MELCC is particularly concerned about modelled nickel concentrations that significantly exceed the standard. The MELCC considers that a significant portion of the elevated ambient nickel concentration is attributable to the activities currently taking place at the Port of Québec site. The MELCC is of the opinion that the authorization of new activities likely to increase the concentration of nickel should only be issued if measures to reduce these activities, present and future, are proposed and applied by the Proponent, so that the realization of the Laurentia Project would not result in a net increase of nickel emissions in the ambient air.

Finally, many consider that Canadian National, a partner in the Laurentia Project, should do its part by reducing its pollutant emissions, in particular by accelerating the renewal of its fleet with newer locomotives (group 4) or even hybrids.

Health Canada recommends to the Agency that an emissions management plan that includes its current facilities be developed and implemented. Environment and Climate Change Canada recommends that the Proponent pursue the current initiative to improve its practices to reduce the air quality footprint of its current operations through the involvement of "specialized firms, research and development firms, and Laval University."

Given the current situation, which is already worrying, any additional emissions are likely to be problematic, mainly in the borough of La Cité-Limoilou. The effects of future projects would add to those of current activities and result in greater cumulative effects. However, the Proponent considers that the Project's effects will be relatively marginal once it would be operating and the construction of future projects will be completed. In its view, the bulk of the anticipated effects are linked to the construction phase of the various projects, particularly the road projects. The Proponent concludes that the Project's completion would not be a significant aggravating factor for the receiving environment, and emphasizes that his Project should encourage the continued stakeholders' collaboration in the community so that they continue to find, in a concerted manner, practices or initiatives that support the improvement of ambient air quality.

With respect to the mitigation measures proposed by the Proponent to reduce cumulative effects, they are the same as those currently applied at the port site for its ongoing operations since 2011 and those planned for the construction and operational phases. In addition to these measures, the Proponent proposes to conduct studies to improve the control of emissions related to ore handling at the bulk terminal. It also notes that the environmental monitoring system would incorporate LiDAR technology to detect and reduce nickel-related emissions (Québec Port Authority, 2020).

Agency's Analysis

The Project would take place in an atmospheric environment where air quality standards and criteria are already being exceeded. The Agency concludes that the direct effects of the Project on air quality would be significant. Since residential, industrial, road, and commercial development in this sector will continue in the future and several major projects are pending, the Agency considers that the Project, in combination with other projects and future activities, could exacerbate current air quality problems. On the other hand, air quality could improve in the coming years, particularly through the electrification of transport and the application of new regulations.

Taking these facts into account, the Agency believes that there is still uncertainty as to the evolution of the baseline of air quality in the central districts, which will continue to evolve in particular according to regulatory changes.

Agency's Conclusion

Despite the small contribution of the Project to air quality degradation, the Agency considers that the Project, combined with past, present and reasonably foreseeable projects, is likely to cause significant cumulative effects on air quality in the airshed area and more specifically in the borough of La Cité-Limoilou.

Since air quality in the airshed area is already affected by a variety of industries and activities, any mitigation measures related to cumulative effects should be developed in consultation with other users of the environment. For this reason, the Agency considers that, in addition to the measures already planned and in place at the Port of Québec and those identified in Section 5.1, the following measures are necessary to help mitigate potential cumulative environmental effects on air quality:

- Pursue efforts to improve air quality with local stakeholders through the *Comité intersectoriel sur la contamination environnementale dans l'arrondissement de La Cité-Limoilou* (CICEL) (or any other committee aimed at improving air quality in the borough of La Cité-Limoilou), of which the Québec Port Authority is a member (established in 2013, the CIECEL brings together several players from the industrial sector, as well as representatives of Québec City, the Ministère de l'Environnement et de la Lutte contre les changements climatiques and citizens);
- Develop a plan to manage atmospheric emissions from all Port of Québec activities, including those generated by the Project;
- Continue to develop initiatives to improve the Proponent's activities to reduce its air quality footprint.

6.3.6 Human Health

The Agency assessed the cumulative effects on human health taking into account that the Project would contribute to the degradation of air quality in a living environment where several environmental and socio-economic risk factors for health are already present and known.

Analysis of Cumulative Environmental Effects and Mitigation and Monitoring Measures Proposed by the Proponent

The Proponent conducted a cumulative human health effects assessment due to concerns about ambient air quality and potential health risks.

According to the Proponent, the main effects likely to add to those of the Project during the construction phase would result from future linear transportation infrastructure projects. The air contaminants emitted by these projects would be similar to those emitted by its Project, namely dust and combustion gases. The duration of the construction phase for these projects would vary, but would be limited to a few years.

As for the operational phase of these projects, it would lead to an increase in traffic on the roadways in some cases (e.g., various road projects and the 3rd road link between Québec City and Lévis), but would lead to a reduction in pressure on the road network in others (e.g., structuring transportation network). The main air emissions associated with the operational phase of these projects would be related to dust, fuel combustion and exhaust gases.

The Proponent based its analysis of cumulative effects on human health on the analysis of cumulative effects on air quality. In its view, taking into account the Project's effects on air quality, baseline conditions and other potential contributors, the contaminants that deserve particular attention in the context of the assessment of cumulative effects on human health are as follows:

- Particles matter (TPM, PM_{10} and $PM_{2.5}$);
- NO_2 and NOx;
- Volatile organic compounds (VOCs).

According to the Proponent, sulphur dioxide (SO_2) is not an issue in the airshed area, although the Project would slightly increase the presence of this contaminant. Consequently, it concludes that there are no significant cumulative effects in the context of the Project for this contaminant in relation to human health.

With respect to fine particulate matter, it would be more likely to be observed at the boundaries of the Proponent's facilities during the construction phase. However, the Proponent considers that the application of the planned mitigation measures would reduce cumulative effects. According to the Proponent, the health effects most likely to occur include increased daily respiratory symptoms and absenteeism from work or school. The likelihood of these effects occurring during the operational phase would be almost nil for the surrounding population. Therefore, the Proponent concludes that the cumulative effects associated with the emission of fine particulate matter would not be significant in the context of its Project.

According to the Proponent, nitrogen dioxide (NO_2) is more likely to cause cumulative health effects, particularly during the construction phase and at the limits of the Port of Québec facilities. The Proponent believes that the maximum concentrations modelled during the construction phase are likely to lead to more visits or hospitalizations for respiratory causes (asthma in children). However, these health risks would decrease significantly during the operational phase. The Proponent points out that attention would be paid

to this contaminant and that, given the measures that would be put in place, one can conclude that cumulative effects on human health would not be significant.

The probability of ground-level ozone causing health effects would also be higher during the construction phase, according to the Proponent. This increased presence of ground-level ozone could result in a very small increase in the risk of mortality and hospitalization and a very low probability of pulmonary effects in predisposed individuals.

Finally, the Proponent concludes that the cumulative effects on human health in relation to the residual effects on air quality are not significant. To support this conclusion, the Proponent relies on the fact that air contaminant emissions associated with the Project would be low and that the Project would bring no significant change to ambient air quality compared to the current situation. It believes that the frequency of population health effects will remain similar to that currently observed. Consequently, the Proponent does not propose any additional mitigation measures, although the proposed monitoring and follow-up program would also apply to the anticipated cumulative effects.

Health Canada suggests that an air emissions management plan applicable to the Project and the existing Port of Québec facilities be developed and implemented (see Subsection 6.3.5). This plan should include mechanisms and procedures for communicating monitoring and follow-up results to the community, as well as procedures for managing complaints, if applicable.

Agency's Analysis

In conducting its analysis, the Agency relies on the analysis and conclusions presented in the sections on the Project's effects on air quality (Section 5.1) and human health (Section 5.7) as well as in the subsection on the Project's cumulative effects on air quality (Subsection 6.3.5). The Agency also takes into account the living environment in which the Project would take place and the characteristics of the population likely to be affected by the Project.

According to the *Direction de la santé publique de la Capitale-Nationale du Québec*, there are significant differences between the health status of the populations in the territories of the Limoilou-Vanier and Basse-Ville Local Community Service Centres (CLSCs) and that of the rest of the population in the Capitale-Nationale du Québec region (CIUSS-CN, 2018). These territories have been the subject of a number of interventions by the *Direction régionale de santé publique de la Capitale-Nationale* (DRSP-CN) in relation to outdoor air quality, healthy housing, gas leaks and, contaminated land. The Public Health Branch is concerned about the simultaneous exposure of the population to several environmental health risk factors and the presence of significant health inequalities that may be related to the environment (CIUSS-CN, 2018).

Social inequalities in health are observed in the lifestyle of the population in these territories, for example in cigarette smoking, in the prevalence of obstructive lung diseases (chronic bronchitis and emphysema), and in hospitalizations for respiratory and cardiovascular diseases (CIUSS-CN, 2018). Compared to the entire Capitale-Nationale du Québec region, the hospitalization rate for respiratory diseases is 1.3 times higher in Lower Town and 1.5 times higher in Limoilou-Vanier (CIUSS-CN, 2018). In addition, in these boroughs, life expectancy at birth is significantly shorter. When compared to other sectors of the Capitale-Nationale du

Québec region, life expectancy at birth is 6 years less in Lower Town and 2.8 years less in Limoilou-Vanier (CIUSS-CN, 2018).

The premature mortality rate, as well as death rates from respiratory diseases, cardiovascular diseases and cancer (trachea, bronchus and lung) remain significantly higher than those of other territories in the Capitale-Nationale du Québec region and even in the province of Quebec as a whole. For example, the mortality rate from respiratory diseases is twice as high in Basse-Ville and 1.4 times higher in Limoilou-Vanier (CIUSS-CN 2018).

The *DRSP-CN* recommends prioritizing the following issues related to outdoor air quality and human health:

- The annual average concentrations of $PM_{2.5}$;
- Exceedances of short-term (hourly, 8-hour, 24-hour) reference values for particulate matter and ozone;
- Air quality at the Vieux-Limoilou station, in a context of health inequalities and cumulative risks;
- The detection of carcinogenic substances, highly toxic contaminants and non-threshold substances deemed safe for health.

For the Agency, the Project's effects on air quality, when combined with the effects of current and future projects, could exacerbate the effects on human health, in particular because they will contribute to degrading the current state of ambient air. Certain regulations or changes in behaviour, particularly in the field of transport, could improve air quality in the coming years for certain contaminants during certain periods of the year. Considering the uncertainties as to the evolution of air quality, the Agency relies on the facts known to date and on the regulations in force to conclude that the cumulative effects of these projects, including the Laurentia Project, could reduce the chances of mitigating the problems identified and prioritized by the *Centre intégré de santé et de services sociaux de la Capitale-Nationale* (CIUSS) and improve the health of the population on its territories.

Health problems related to air quality will also add to the those already present in the community and thus increase existing social inequalities.

Agency’s Conclusion

Despite the small contribution of the Project to air quality degradation, the Agency considers that the Project, in combination with past, present and reasonably foreseeable future projects, is likely to cause significant cumulative effects on human health in the expanded study area and more specifically in the borough of La Cité-Limoilou.

Since human health in the borough of La Cité-Limoilou is already affected by social and health inequalities, the Agency considers that no mitigation or follow-up measures can sufficiently mitigate cumulative effects to make sure that they do not become significant. However, the Agency considers that the measures provided for in Sections 5.1 and 5.7 and Subsection 6.3.5 can reduce cumulative effects on human health to some extent.

7. Impacts on Aboriginal and Treaty Rights

The Agency assessed the potential impacts on rights of Indigenous peoples and their degree of severity by examining the relationship between Project activities and the conditions necessary for the exercise of rights, such as the availability and quality of resources, access to territory, or the experience related to the exercise of rights and cultural transmission.

Following its analysis, the Agency concluded that the Project is likely to have a high level of impact on Aboriginal and treaty rights.

This section summarizes how the Project is likely to affect the rights of the First Nations selected for consultation. Appendix D summarizes the main concerns identified by the Indigenous communities during the environmental assessment up to the publication of this report and indicates how the Proponent and the Agency have responded to them.

Impacts on current uses of lands and resources for traditional purposes are considered and assessed in Section 5.9 of this report. The cumulative effects of the Project on current land and resource uses are assessed in Section 6.3.

7.1 Aboriginal and Treaty Rights

The study area selected by the Proponent to assess the effects of the Project on Indigenous peoples is the extended study area (introduction, Figure 3). However, the Agency points out that the Project's adverse effects could also be felt by First Nations outside the expanded study area. The Agency also took into account the concerns of First Nations regarding the potential impacts of Project activities outside the scope of the environmental assessment, including the cumulative effects of navigation.

In the course of its assessment, the Agency found overlaps between the claims and land assertions of certain First Nations in the expanded study area of the Project. This analysis is not a rights determination process. In this chapter, the Agency reports on the information shared by First Nations in full respect of their respective positions.

7.1.1 The Huron-Wendat Nation

The Huron-Wendat Nation was established at the end of the 17th century in the Wendake reserve. It is the only Huron-Wendat reserve in Canada. Wendake is located on the shores of the Saint-Charles River called *Akiawenrahk* in the Huron-Wendat language, which means “trout river”. Wendake is located in the administrative Capitale-Nationale du Québec region and is landlocked by Québec City, approximately 18 kilometres from the proposed Project site. The Project area is located in the heart of the ’Nionwentsïo’,

which means “our magnificent territory” in the Huron-Wendat language, the traditional territory of the Huron-Wendat Nation. According to information transmitted by the Council of the Huron-Wendat Nation, this territory covers 66,056 square kilometres and extends, from north to south, from the Saguenay River to the U.S. border. From east to west, it runs from New Brunswick to the Saint-Maurice River. The southeastern fringe of this territory also includes a small part of the State of Maine, between the Saint John River and the Canada-U.S. border.

The Huron-Wendat Nation indicated in its submission to the Agency in March 2017 that the rights and freedoms protected by the Huron-British Treaty of 1760 include, but are not limited to, freedom of trade and religion, the right to practise customs such as hunting, fishing, trapping, gathering, traditional rites, the peaceful enjoyment of Nionwentsino and, more generally, the right to self-government. According to the Huron-Wendat Nation, this Peace and Alliance Treaty seals the nation-to-nation and treaty partner relationship between the Crown and the Huron-Wendat Nation. The rights protected by this treaty are entrenched in the Canadian Constitution through section 35. This treaty, whose validity was recognized by the Supreme Court of Canada in 1990 in the Sioui[59] decision, protects the customary and religious activities of the Huron-Wendat Nation that take place on the Nionwentsïo.

The Huron-Wendat Nation explains in its brief (2017) that members of the Huron-Wendat Nation have continued to frequent the Project study area since the 16th century. As part of the Project, the Huron-Wendat Nation also conducted a complementary study in 2016[60] on the occupation and use of the expanded study area by members. The results of this study were used by the Proponent in its Impact Statement.

7.1.2 The Innu First Nations

The First Nations of Essipit, Pessamit and Pekuakamiulnuatsh (Mashteuiatsh) are among the nine Innu First Nations in Quebec. The Project's expanded study area does not overlap with the traditional territories (“Nitassinan” which means “Our territory” in Innu-aimun) specific to each of the three communities. However, the expanded study area is partly included in Nitassinan common to the three First Nations (the “Southwestern part”), whose boundaries are linked, according to the Innu First Nations, to their thousand-year-old occupation. This territory covers an area of 14,794 square kilometres and corresponds approximately to the Capitale-Nationale du Québec region.

The Innu community of Pessamit is located on the Upper North Shore of the St. Lawrence River, west of the municipality of Baie-Comeau, approximately 140 kilometres east of Tadoussac and about 360 kilometres from the proposed Laurentia Project site. “Pessamit” means “where there are lampreys” in the Innu language. The Nitassinan of Pessamit, as described in the Agreement of General Principles (EPOG[61]), covers a total

[59] Sioui Judgment: https://scc-csc.lexum.com/scc-csc/scc-csc/fr/item/608/index.do

[60] Study included in the Aboriginal Communities Companion Study, WSP, 2016: https://www.ceaa.gc.ca/050/documentus/p80107/116785F.pdf

[61] Agreement signed between the Petapan Regroupement and the federal and provincial governments in 2004 laying the groundwork for the negotiation of a future treaty: https://www.rcaanc-cirnac.gc.ca/fra/1100100031951/1539797054964

area of approximately 137,800 square kilometres. Its western boundary borders the Nitassinan of the Pekuakamiulnuatsh, to the southwest, that of Essipit and to the east, that of the Innu of Uashat mak Mani-Utenam (Sept-Îles).

The Essipiunnuat (or Innu of Essipit) were formerly called Montagnais of Les Escoumins. The Innu reserve of Essipit (which means “shellfish river”) is located on the Upper North Shore of the St. Lawrence, near the municipality of Les Escoumins, about 40 kilometres east of Tadoussac and 254 kilometres from the proposed Project site. The Essipit Nitassinan, as described in the General Agreement of Principles (GAP), covers a total area of approximately 8,400 square kilometres including the maritime portion (estuary and Fjord). This traditional territory includes the Tadoussac region and part of the Saguenay River and the Vallin Mountains. To the east, it is bordered by the Portneuf River.

The Pekuakamiulnuatsh (or Ilnuatsh of the Pekuakami) were formerly called Montagnais of Lac-Saint-Jean. The Mashteuiatsh reserve is located near the municipality of Roberval, approximately 210 kilometres north of the Project site. Mashteuiatsh means “where there is a point” in the Innu language. The Nitassinan of the Pekuakamiulnuatsh covers nearly 79,000 square kilometres. This territory corresponds to most of the administrative region of Saguenay-Lac-Saint-Jean, as well as part of the Capitale-Nationale du Québec region and the Mauricie region.

In the briefs submitted to the Agency in June and July 2019, the First Nations of Essipit, Pessamit and Pekuakamiulnuatsh affirm that they jointly hold Aboriginal rights and title to the Project site located in the “southwest” part. According to the report provided by the First Nations of Essipit and Pekuakamiulnuatsh to the Proponent in May 2016 (Pekuakamiulnuatsh Takuhikan and CPNIE, 2016), at the beginning of the 17th century, the Québec City region was considered part of Innu territory. Under the pressure of colonization, epidemics, and the reduction of wildlife resources, the Innu then progressively retreated northeastward on the north shore of the St. Lawrence (Pekuakamiulnuatsh Takuhikan and CPNIE, 2016).

7.1.3 The W8banaki Nation

The W8banaki Nation includes the communities of Odanak and Wôlinak, both located on the south shore of the St. Lawrence between Sorel and Bécancour. The community of Wôlinak is located 152 kilometres from the Project area, and the community of Odanak, 178 kilometres away. Of Algonkian origin, the name of the W8banaki Nation comes from the terms “W8ban” (white light) and “Aki” (land) meaning “people of the dawn”.

According to the Proponent, the W8banakiak claim to be among the “mission Indians” in the St. Lawrence Valley allied with the King of France who made a treaty at Oswegatchie in 1760 with the British Crown. In addition, the Court of Appeal of Quebec ruled[62] that the Oswegatchie Treaty of 1760 is a treaty that recognizes the right of “mission” Indigenous peoples in the St. Lawrence Valley to remain on settled lands and, for a nomadic people, a right of access to traditional hunting and fishing territories (Englobe, 2018).

[62] Côté Judgement, 1993 : https://www.canlii.org/fr/qc/qcca/doc/1993/1993canlii3913/1993canlii3913.pdf

According to the map provided by the Ndakina Office to the Proponent, the boundaries of the territory (Ndakina[63]), over which W8banakiak have Aboriginal and treaty rights, extend from west to east, from the Richelieu River to east of Montmagny. For the north-south boundaries, in addition to the north shore of Lake St. Pierre and the islands of Sorel, the boundary extends from the south shore of the St. Lawrence River to the United States.

Thus, the portion of the ancestral territory, which includes the city of Lévis, is intersected by the Project's expanded study area. The boundaries listed are subject to change by the Ndakina Office. The zone for the practice of hunting, fishing and trapping activities for food, ritual or social purposes, whose limits were established following an agreement between the Wôlinak and Odanak Councils and the Government of Quebec in 2001, covers the southern half of the ancestral territory. This zone is located at a distance of more than 70 kilometres south of the extended study area. A code of practice governs traditional activities and their management (Englobe 2018 and GCNWA, 2015).

7.1.4 Wolastoqiyik (Maliseet) Wahsipekuk First Nation

The Wolastoqiyik (Maliseet) Wahsipekuk First Nation is the only Maliseet First Nation in Quebec. It has a territory located in Whitworth Township, near Rivière-du-Loup, and a small lot in Cacouna. These two territories are not inhabited. The Maliseet in Quebec are not grouped into communities, but live scattered over the territory.

The Cacouna reserve is adjacent to the municipality of the same name and is located approximately 222 kilometres from the Project site. The Whitworth reserve is located on the south shore of the St. Lawrence River and is approximately 230 kilometres from the Project site.

Called *Etchemins* by Samuel de Champlain, the Maliseet belong to the Algonquin linguistic family. They called each other “Wulust'agooga'wiks”, meaning “People of the Beautiful River”. According to the Proponent, the Wolastoqiyik (Maliseet) Wahsipekuk First Nation has occupied and used, since time immemorial, a territory in Quebec located on the south shore of the St. Lawrence River, between the Chaudière River, near Lévis, and the Mitis River, near Mont-Joli. According to the Wolastoqiyik (Maliseet) Wahsipekuk First Nation, the ancestral territory known as Wolastokuk joins the northern shores of the St. Lawrence and part of the banks of the Saguenay River. The Project's extended study area is located at the southwestern extremity of this territory and thus intersects the Wolastokuk (Englobe, 2018).

According to public information gathered by the Proponent, the Maliseet have been pursuing exploratory discussions with the federal government since 2003 on comprehensive land claims. These negotiations have the dual objective of clarifying Aboriginal rights and implementing the various historic treaties of peace and friendship. In Marshall (R. v. Marshall, [1999] 3 S.C.R. 456), the Supreme Court of Canada ruled that these Peace and Friendship Treaties confirmed the right of certain Indigenous groups to hunt, fish and gather, and to trade in the products of these activities as a means of “moderate livelihood”.

[63] “Ndakina” means “Our land” in aln8ba8dwaw8gan (w8banaki language)

According to the Proponent, the contemporary use of the territory by members of the Wolastoqiyik (Maliseet) Wahsipekuk First Nation remains relatively undocumented. However, the First Nation has indicated to the Agency[64] that it is in the process of documenting the various usages of its members and has indicated a use of the expanded study area by its members since many members live in and frequent this area and its historical use by the Maliseet is documented.

7.1.5 Kahnawà:ke, Kanesatake and Akwesasne Mohawk First Nations

The Kahnawà:ke Mohawk Reserve is located on the south shore of the St. Lawrence River, 10 kilometres southwest of Montréal, at the elevation of Lake Saint-Louis, approximately 280 kilometres upstream from the Project study area. According to the documentation consulted by the Proponent, Kahnawà:ke means “near the rapids” or “on the rapids” in *Kanienke,* the Mohawk language. This term refers more specifically to the Lachine Rapids, which are located near the eastern boundary of the reserve. They assert that they have rights, titles and interests in the area affected by the Project since, according to oral tradition, the St. Lawrence Iroquoians, their ancestors, would have already occupied this area. In its shared submission to the Agency in August 2019, the Mohawk Council of Kahnawà:ke also claims other rights, including, but not limited to, Aboriginal title, governance rights (including environmental management based on the Two Row Wampum treaty and “Ohen:ton Karihwatehkwen”, the basis for decision-making centred on respect for the environment as a whole) and the rights to collect and trade in the St. Lawrence River as inherent rights and section 35(1) of the *Constitution Act*, 1982. The Council also told the Agency that Mohawks are the guardian of the eastern gateway to the Iroquois Confederacy. The Mohawks of Kahnawà:ke, therefore, are responsible for dealing with issues from the mouth of the St. Lawrence River to the Great Lakes and hold this responsibility in high regard.

The community of Kanesatake is located on the north shore of the Deux-Montagnes Lake, at the junction of the Ottawa River, 53 kilometres west of Montréal and approximately 300 kilometres from the Project site. The Kanesatake First Nation traditional territory does not overlap the Project study area.

The Akwesasne First Nation is located approximately 383 kilometres from the Project site. The Akwesasne traditional territory does not affect the Project study area. According to information gathered by the Proponent, this territory includes part of the St. Lawrence River, at the mouth of the Raquette and St. Regis rivers, as well as several islands located on these bodies of water. The Akwesasne territory straddles Ontario, Quebec and the state of New York in the United States. (Englobe, 2018)

The Supreme Court of Canada’s 1996 Adams[65] decision recognized the Mohawks' right to fish for food in Lake St. Francis and the St. Lawrence River, based on the Nation's practices before contact with Europeans. The decision does not specify on which portion of the river the right to fish applies. The decision simply cites

[64] Meeting between the Agency and the Wolastoqiyik Wahsipekuk Nation on Rights Impact Assessment (September 23, 2020)

[65] https://scc-csc.lexum.com/scc-csc/scc-csc/fr/item/1420/index.do

the historical analysis presented to the Court. This analysis concluded that at the time of European contact, when Aboriginal rights crystallized, the Mohawks had military control of the St. Lawrence River between Montréal and Lake Ontario. The Côté decision (1993) of the Court of Appeal of Quebec, based on the Oswegatchie Treaty of 1760, recognized the signatory Indigenous Nations' rights to their lands, as well as their right to hunt and fish as they traditionally did. The Oswegatchie Treaty was signed between the British and some indigenous nations, including Mohawk First Nations.

Despite communications sent to Kanesatake and Awesasne First Nations, it was not possible for either the Proponent or the Agency to obtain information concerning the uses and rights exercised by the members of these First Nations that could be affected by the Project.

7.2 Potential Negative Effects of the Project on Aboriginal and Treaty Rights

7.2.1 Potential Impact Pathways on the Exercise of Rights

Since 2015, the Agency has received several briefs from First Nations and has had several exchanges with them regarding the assessment of the Project's potential impact on their rights. The main concerns that have been raised are related to the following elements:

- The impact of the Project on certain migratory species of fish of interest, including lake and Atlantic sturgeon and American shad;
- The impact of the Project on fish and fish habitat, particularly on the striped bass, an endangered species;
- The potential impacts of the Project on the exercise of rights (including fishing and hunting of migratory birds) and customary laws;
- The cumulative effects of increased navigation and other activities resulting from the various port projects on the St. Lawrence River;
- The importance of consulting First Nations on mitigation or offset measures that may affect their Aboriginal rights;
- Access to the territory and the transfer of knowledge.

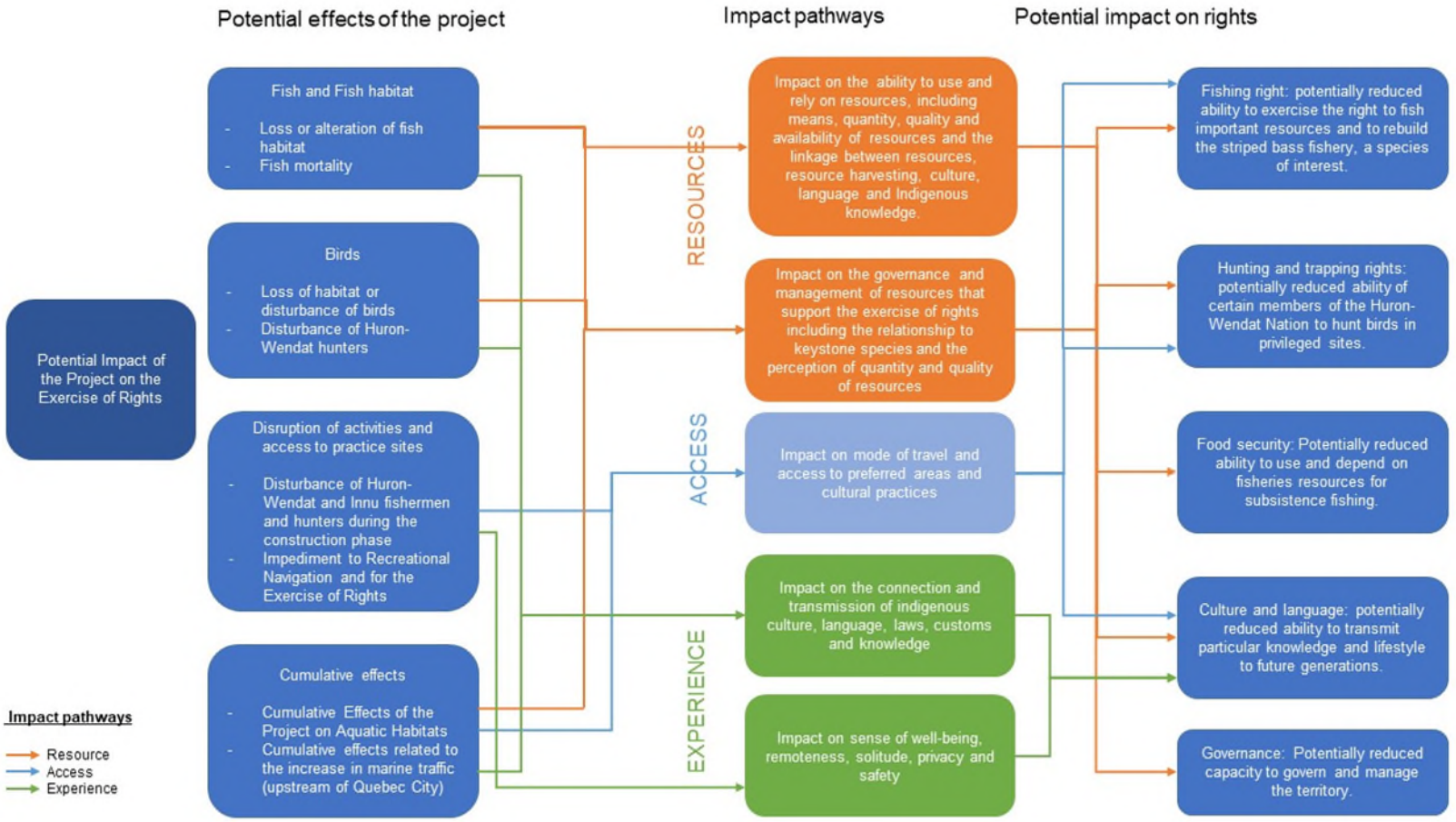
The Huron-Wendat Nation also expressed certain concerns to the Agency regarding the Project's effects on terrestrial wildlife environments and habitats, including questions on the mitigation and offset measures planned by the Proponent (see Appendix D).

As for historical and cultural heritage, it was not the subject of major concerns although the Huron-Wendat Nation and the Innu First Nations raised the historical importance of the Project site and of adequate archaeological digs (see Section 5.10).

The Huron-Wendat Nation has expressed concerns to the Agency about the potential impact of the Project on the exercise of its right to trade, through the restriction of access to the territory, or through negative effects on the quality and abundance of the St. Lawrence River resources. The Innu First Nations have expressed similar concerns to the Agency in relation to their commercial practices downstream of the Project.

The diagram below (Figure 15) and the elements that follow reflect the main advice and concerns expressed by the First Nations regarding the Project's potential impacts on their rights and the ways in which the Project could affect the exercise of these rights. The rights impact assessment methodology used by the Agency classifies these impact pathways into three categories: Resources, Access, and Experience.

Figure 16: Visual presentation of pathways of potential impact of the Project (resource, access, experience) on the rights of the First Nations who participated to the environmental assessment



Source: Agency, 2020

First Nations' Vision

Fishing Right

As shown in Figure 15, First Nations fishing rights would be affected primarily by the Project's direct and cumulative effects on fish and fish habitat, by affecting the possibility for First Nations to use and manage the resource and to pursue their cultural practices related to the harvesting of the resource (Resource Impact Pathway – arrows and boxes in orange – Figure 15). To a lesser extent, and for certain First Nations only, the right to fish could also be affected by potential effects on access to the practice sites in connection with shipping (Access Impact pathway – blue arrows and boxes in the figure).

The Huron-Wendat Nation emphasized to the Proponent and the Agency the importance of the Project's expanded study area, including the construction zone, where several fishing sites used by its members are located. In its shared submission to the Agency in 2017, the Huron-Wendat Nation expressed its disagreement with the Proponent's analysis qualifying the residual effects of the Project on the current use of land and resources as minor and insignificant. According to the Huron-Wendat Nation, the disturbance of fishermen during the construction phase, as well as the need for fishermen to adapt during the operational phase, are significant.

The Essipit First Nation indicated that the monitoring of the traditional practices of its members (*Innu-aitun Monitoring*) made it possible to identify that some of them practised walleye fishing within the Project study area.

The W8banaki Nation, the First Nations of Essipit, Pessamit and Pekuakamiulnuatsh, and the Kahnawà:ke First Nation emphasized the importance of the Project's study area for fish and fish habitat, particularly for migratory fish species fished downstream and upstream of the expanded study area by these First Nations.

Information on First Nations' uses and fished resources as well as information on the location of certain practice sites can be found in Section 5.9.

First Nations who participated in the environmental assessment raised concerns about the Project's direct and cumulative effects on fish and fish habitat, particularly on migratory species such as lake and Atlantic sturgeon, American shad and striped bass, some of which are at risk, which could affect their fishing rights. Beyond the right to fish, these First Nations are also concerned more globally for the health of fish and aquatic ecosystems. Regarding striped bass, they have mentioned an interest in this species and are concerned about its status and the threat that the Project would represent for its recovery. First Nations also mentioned that among their members, they favour the release of striped bass in order to help its population recover and favour, when the conditions will be met, the resumption of fishing for this species. Fishing limits for sturgeon are also applied by W8banakiak.

The Huron-Wendat Nation and the Innu First Nations also indicated, in their discussions with the Proponent, that the fishing of certain species constituted as food and subsistence fishing for some of their members (Englobe, 2018b). In the event that the Project would affect the availability, quality and access to resources,

the Mohawk Council of Kahnawà:ke (2019), also expressed concern for its food sovereignty and, the food security of its members and, more broadly, for their ability to make decisions about their food system and their relationship to the land through food.

First Nations also mentioned the impact that the effects on fish and fish habitat could have on cultural transmission and territorial experience. The Mohawk Council of Kahnawà:ke, in particular, indicated to the Agency (August 2019) that the effects of the Project on Mohawk fishing rights could have an adverse impact on Mohawk culture and language by affecting, for example, their ability to use linguistic terms related to this practice. The Grand Conseil de la Nation Waban-Aki also explained that any effect on fish species of interest that could lead to a decrease in fishing success could ultimately affect the ability of the W8banakiak to transfer their knowledge and all the experience and benefits related to fishing and use of the territory such as a sense of healing, introspection, benefits to the family unit and a sense of individual and cultural continuity. According to the Grand Conseil de la Nation Waban-Aki, women would be more affected by the effects on fish since it would be more difficult for them to rely on other species in practice sites that are more distant from the communities. Some First Nations also noted the unique cultural importance of particular species, such as the two sturgeon species for W8banakiak or sturgeon and American shad for the Mohawks of Kahnawà:ke.

Hunting and Trapping

As shown in Figure 15, and according to the information available to the Agency, the right to hunt migratory birds could be affected, to a lesser extent than the right to fish, in two ways: the effects on the resource due to the potential disturbance of the birds and by the effects on the experience on the territory due to the disturbance of hunters, particularly during the construction phase (Resource and Access impact pathways – arrows and boxes in blue and orange in Figure 15).

Information on First Nations' uses and the practice of hunting and trapping, particularly migratory bird hunting, can be found in Section 5.9.

According to the Proponent, members of the Huron-Wendat Nation hunt migratory birds in and near the extended study area. The complementary study conducted by the Huron-Wendat Nation in 2016 identifies five migratory bird hunting sites used by its members in the vicinity of the Project, including one located in Baie de Beauport. Members hunt snow geese, Canada geese and various species of ducks.

The Wolastoqiyik (Maliseet) Wahsipekuk First Nation did not share any information regarding the practice of migratory bird hunting with the Proponent. However, the First Nation has indicated to the Agency[66] that it is in the process of documenting the uses of its members and has indicated a use of the extended study area by its members, since many members live in and use this area and its historical use by the Maliseet is documented.

[66] Meeting between the Agency and the Wolastoqiyik Wahsipekuk First Nation on Rights Impact Assessment (September 23, 2020)

The W8banaki Nation and the Kahnawà:ke First Nation did not share any concerns, either with the Proponent or the Agency, regarding hunting and the potential effects of the Project on this practice. However, the Innu First Nations mentioned to the Agency that migratory bird hunting is practised by some of their members outside the extended study area, but relatively close to the sector studied by the Proponent. These First Nations are concerned that increased disturbance near the Project will increase competition for the more distant hunting sites used by their members.

Other Uses: Navigation and Recreational Activities

According to the Huron-Wendat Nation's 2016 supplementary study, other documented uses in the expanded study area fall under the general category of recreational activities (Englobe, 2018b). According to this survey, some members regularly engage in small and motorized boating on the St. Lawrence River, including Baie de Beauport. Recreational and family activities in the Baie de Beauport were also reported by several members of the Huron-Wendat Nation residing in Wendake.

According to the Proponent and following consultations with the Ndakina Office, although members of the W8banaki Nation do not make specific use of the expanded study area for activities such as fishing or hunting, some members of the Nation navigate in the expanded study area for recreational purposes and as a traditional activity (Englobe, 2018b).

The Essipit, Pessamit and Pekuakamiulnuatsh Innu First Nations did not mention, either to the Proponent or to the Agency, the practice of other uses such as navigation in the extended study area or in its vicinity. The same applies to the Wolastoqiyik Wahsipekuk First Nation. However, as previously mentioned, the documentation of the use of the expanded study area by these First Nations has not been completed.

According to the Proponent, no traditional, recreational or commercial activities would be carried out by members of the Kahnawà:ke, Kanesatake and Akwesasne Mohawk First Nations in the expanded study area.

First Nations' concerns related to recreational uses and navigation in particular, within and outside the expanded study area are mainly related to marine traffic and the increase of marine traffic (Access Impact Pathway – blue arrows and boxes in Figure 15). Several First Nations mentioned the lack of certainty regarding the increase in marine traffic generated by the Project and the possible changes to the Project's vessel carrying capacity in the future. The Innu First Nations, for their part, mentioned the potential impacts of the increase in marine traffic due to the Project, downstream of the expanded study area, particularly on beluga whales and on their commercial fishing activities (see Section 5.8).

Culture and Language

First Nations who participated in the environmental assessment mentioned the direct link between the exercise of rights and the practice of their culture and way of life and shared their concerns regarding the direct and cumulative effects of the Project on them. The intergenerational transfer of knowledge was particularly cited by First Nations as being dependent on the members' capacity to perform their practices

under adequate conditions. As shown in Figure 15, any effect of the Project on resource, access and experience are likely to result in impacts on indigenous language and culture. For Mohawks, food and harvesting practices are at the core of cultural continuity, linking past, present and future. The revitalization of language, cultural practices and knowledge system depends on their connection to the land and water, and on their continued harvesting, processing and consumption of traditional foods such as fish. Harvesting fish allows families to spend time on the water and to connect with culturally and spiritually important places along the River. Teaching about environmental terminology, harvesting and processing techniques, and ways of relating to the environment go hand in hand with these activities. The Innu First Nations have also specified that the Beauport Bay site is one of the last places in the sector that still offers the possibility for their members residing in the Québec City region to access the river and its banks, for the practice of traditional activities or simply to “appreciate” nature, the experience, the contact with this sector that is important to the Innu. The Project, by its presence in the landscape and its encroachment on the river and the beach of Beauport Bay would, according to them, contribute to discouraging the expression and vitality of the culture.

Regional, Historical and Cumulative Context

The Grand Conseil de la Nation Waban-Aki, the First Nations of Kahnawà:ké, Wolastoqiyik Wahsipekuk, Huron-Wendat and Innu First Nations shared their concerns with the Agency and the Proponent regarding the cumulative effects of the Project and those related to the increase in marine traffic generated by the Project. In summary, these concerns are related to:

- effects on aquatic ecosystems, fish and fish habitat;
- the risk of introducing invasive species;
- limiting access to fishing grounds, which are valued sites for the intergenerational transfer Indigenous knowledge;
- increased risk of accidents and spills, putting at risk the safety and health of Indigenous communities;
- adverse impacts on crab, groundfish, green sea urchin and Atlantic salmon fishing activities, as well as clam harvesting and migratory bird hunting;
- adverse effects of marine transportation on beluga whales upstream from the study area.

The First Nations also raised the following issues related to the increase in marine traffic generated by the Project and, more generally, the cumulative effects of present and future port projects:

- Limited access to the river that restricts the ability of Indigenous peoples to practise their traditional, spiritual and recreational activities (fishing, swimming, community gathering, canoeing, etc.);
- Increased shoreline erosion and associated environmental impacts (e.g., increased water turbidity, loss of riparian areas, deterioration of boat launch ramps, etc.).

The cumulative effects of the Project therefore generate concerns in terms of resources, access and experience, which are illustrated respectively by the orange, blue and green boxes and arrows in Figure 15.

The Huron-Wendat Nation, the Grand Conseil de la Nation Waban-Aki and the Mohawk Council of Kahnawà:ke explained their understanding of the cumulative effects resulting from the Crown's approval of the Project in the event that the Crown would also approve the realization of other port projects currently under study, including those proposed by the Montréal Port Authority (MPA) in Contrecoeur and the Trois-Rivières Port Authority (TRPA) in Trois-Rivières. Considering the various port projects currently under study, the Grand Conseil de la Nation Waban-Aki and the Mohawk Council of Kahnawà:ke believe that a comprehensive study of the St. Lawrence River is necessary.

The three Innu First Nations, for their part, raised the same concerns regarding cumulative effect by evoking the projects mentioned above as well as projects in the Saguenay region. They also indicated that they were concerned not only about the increase in marine traffic but also about the larger size of the vessels that would affect the navigation of small boats downstream from the Project. According to them, traditional fishing and food practices, hunting (birds, seals) and other navigation activities are victims of constant and growing constraints in connection with the increased appropriation of the St. Lawrence River by the merchant marine.

Territory Governance

First Nations reminded the Proponent and the Agency of their stewardship and responsibility for the land. The Kahnawà:ke First Nation indicated (MCK, 2019) that the Project would directly affect their governance, fishing and general stewardship rights and that the threshold for their ability to exercise their rights has been crossed with the construction of the Seaway and the expansion of marine transportation since the 1950s.

The Grand Council of the Waban-Aki Nation believes that the initiatives and efforts invested by the W8banakiak in the protection and monitoring of fish (striped bass, sturgeon) could be negated by the impacts of the Project, which would have an impact on the governance and self-determination of the Nation.

The Huron-Wendat Nation was in favour of the Project, but stressed the importance that the effects of the Project on the environment and resources must be accurately assessed. The Nation also mentioned to the Agency that this support is part of a context where the Proponent is committed to putting in place accommodation measures commensurate with the impacts of the Project on the rights, activities and interests of the Nation.

As shown in Figure 15, the concerns expressed by First Nations in relation to the direct impacts of the Project on their governance are mainly related to the effects of the Project on the resource. Regarding the cumulative effects of the Project related to the increase in navigation, they also generate concerns related to resource governance (orange boxes and arrows – Figure 15).

Agency's Analysis on Rights Impact Pathways

As described in Section 5.9, the Agency is of the opinion that the Project would cause significant residual adverse environmental effects on the current use of lands and resources for traditional purposes and more specifically on the fishing activities practised by the Huron-Wendat Nation, the W8banaki Nation, the Essipit, Pekuakamiulnuatsh and Pessamit Innu First Nations, Kahnawà:ke First Nation, and the Wolastoqiyik

(Maliseet) Wahsipekuk (Maliseet) First Nation. Concerning the Kanesatake and Akwesasne Mohawks First Nations, as previously mentioned, it was not possible to obtain information concerning their uses and the exercise of their rights. However, it is reasonable to believe that these two First Nations fish migratory species and that, consequently, the repercussions on fishing rights would be the same for these two communities as for the Kahnawà:ke First Nation. Considering that the Project could have effects on the populations of several fish populations already at risk (see Section 5.4) and of interest to these First Nations, the Agency considers that the fishing rights of these First Nations could be compromised by the Project. The fishing right could also be modified by the removal or modification of access to certain practice sites for the Huron-Wendat Nation.

- The Agency is of the opinion that the loss and modification of habitats caused by the Project encroachment and dredging on migratory species such as striped bass, lake sturgeon, Atlantic sturgeon and American shad could compromise the First Nations right to fish for these resources. The effects of the Project could also have repercussions on cultural practices and the overall experience surrounding the exercise of fishing rights, such as community sharing or the intergenerational transfer of knowledge. Section 5.9 describes the potential impacts on the uses of each First Nation according to the species they value more particularly;
- Because of the cumulative effects on the fish species mentioned above, the Project is also likely to have cumulative effects on the right to fish;
- The presence of the construction site and noise during the construction phase could have an impact on the access and experience in the practice sites and the practice of fishing and hunting rights for migratory birds by members of the Huron-Wendat Nation and fishing for certain members of the Essipit First Nation. Navigation, recreational and family activities practised near the work site by the Huron-Wendat Nation and the W8banaki Nation would be disturbed by noise and construction activities (Englobe, 2020f);
- With respect to access to the territory, the Proponent indicates that public access to the river located on the territory of the Québec Port Authority would remain open during the construction and operational phase. The Agency is of the opinion that the effects on access to First Nations practise sites, both within and outside the expanded study area, during the construction and operational phase of the Project, would be limited;
- The increase in marine traffic generated by the Project could cause additional disruption for members of the Huron-Wendat, Essipit, Pekuakamiulnuatsh, Pessamit, Wolastoqiyik (Maliseet) Wahsipekuk First Nations and members of the W8banaki Nation frequenting and navigating in the expanded study area or downstream from it. However, according to the Agency, since the vessels would use the same waterways as now, it is likely that the increase in traffic, with an annual variation of 52 to 156 vessels, would be hardly noticeable in an environment where the average annual vessel movement is 5,000 to 6,000 (Englobe, 2020f). Concerning the Mohawks and W8banaki First Nations located upstream of the Project, the information shared by the Proponent is to the effect that no increase in maritime traffic would be generated between Québec City and Montréal. The Agency is therefore of the opinion that the recreational and navigational activities practised by the members of these First Nations would not be affected by the Project, either in terms of access or experience.

7.3 Proposed Mitigation and Accommodation Measures

Certain mitigation and accommodation measures proposed by the Agency in the Environmental Assessment Report would mitigate the effects of the Project that may affect rights and the practice of traditional activities. These measures relate to fish and fish habitat (Section 5.4), migratory birds (Section 5.5), the current use of land and resources for traditional purposes (Section 5.9) and accidents and malfunctions (Section 6.1). However, these measures would not prevent high severity impact on Aboriginal rights. Indeed, since Fisheries and Oceans Canada considers that the Project, in its current form, could not be authorized under the *Species at Risk Act*, no offset plan for fish has been considered by the Agency. As a result, given the current design of the Project and the status of the species potentially affected, the impacts on traditional uses and Aboriginal rights related to significant effects on fish and fish habitat cannot be mitigated or accommodated. Should the Project be allowed to proceed, the government will consult with First Nations to determine what additional mitigation or accommodation measures would be required to mitigate the impact on rights.

7.4 Other Measures

With respect to cumulative effects, the Agency highlights the existence of Transport Canada's initiative to assess the cumulative effects of marine transportation, developed under the Oceans Protection Plan (OPP) and the St. Lawrence Action Plan. Several First Nations concerned by the Project are participating in this initiative. The Agency recognizes that this study only partially addresses the concerns raised by the First Nations in relation to the cumulative effects of the port projects currently under study. Nevertheless, it is of the opinion that this initiative could provide answers to some shared issues and that its results could be used in future impact assessments, particularly in terms of improving the assessment of the cumulative effects of marine transportation.

On July 2020, the Mohawk Council of Kahnawà:ke filed a request[67] for a Regional Assessment of the St. Lawrence River Area under subsection 97(1) of the *Impact Assessment Act*. The Grand Conseil de la Nation Waban-Aki and the Council of the Huron-Wendat Nation supported this request. After careful consideration, the Minister of Environment and Climate Change (the Minister) has determined that such a regional assessment has potential benefits at various levels. In order to deepen the analysis and to help define the nature, scope, objectives and results of such an assessment, the Agency proceeded to mobilize federal and provincial authorities, the Mohawk Council of Kahnawà:ke, other interested First Nations, and other non-governmental organizations between January and April 2021. The results of this process will be subject of a report, shared with the Minister to allow him to make a final decision on the conduct of a Regional Assessment

[67] https://www.ceaa.gc.ca/050/evaluations/proj/80913?&culture=en-CA

The Agency is aware that these two initiatives cannot be considered as effective accommodation measures in relation to the effects of the Project on the rights of First Nations, notably because their results will not be available before the end of the evaluation.

7.5 Issues to be Addressed in the Regulatory Approvals Phase

The regulatory approvals phase, during which federal authorizations or permits are considered, would take place after the completion of the environmental assessment. In the event that the Project is authorized under CEAA 2012, Fisheries and Oceans Canada would continue to consult with Indigenous communities in the pursuit of regulatory processes under the *Fisheries Act* and the *Species at Risk Act*. The Agency forwarded comments it received from Indigenous communities during the environmental assessment to Fisheries and Oceans Canada so that the department could consider them before making its decisions under the Acts it administers. Where appropriate, Fisheries and Oceans Canada's decisions will take into account the results of ongoing consultations with Indigenous communities as well as the record of consultations resulting from the environmental assessment.

7.6 Agency's Conclusion on Impacts on Aboriginal Rights

The Agency concludes that the Project is likely to have a high impact on the Aboriginal and treaty rights of the Huron-Wendat Nation, the W8banaki Nation and the Kahnawà:ke Mohawk First Nation, Essipit Innu First Nation, Pekuakamiulnuatsh (Mashteuiatsh) First Nation, Pessamit Innu First Nation and Wolastoqiyik (Maliseet) Wahsipekuk First Nation. It was not possible to obtain information regarding the use and exercise of rights of the Mohawk First Nations of Kanesatake and Akwesasne. The Project's effects on fish and fish habitat, particularly on striped bass, lake sturgeon, Atlantic sturgeon and American shad, could reduce the numbers of these populations that are prized, valued and fished by First Nations and, consequently, have repercussions on the exercise of fishing rights as well as on the activities and customs surrounding this right. The impacts of the Project on the right to fish could interfere with or prevent the transfer of knowledge, culture and language related to this practice or the affected fish species. The Project could also lead to a loss of confidence in the quality of traditional resources. The Agency has identified the main mitigation measures likely to reduce the potential effects of the Project on the Aboriginal right to fish. However, these measures would not sufficiently mitigate the potential effects of the Project to consider the severity of the impact on rights as not significant. Indeed, the impacts on traditional uses and Aboriginal rights related to significant effects on fish and fish habitat cannot be accommodated given the current form of the Project and the status of the fish species potentially affected.

The Agency also recognizes the potential changes in the exercise of the Huron-Wendat Nation's right to hunt migratory birds.

The Agency is of the opinion that the Project is part of a history of anthropogenic development in the region where the seriousness of the repercussions on the rights of First Nations in relation to cumulative effects is high and that, as a result, the exercise of their rights, including their capacity for land stewardship, is diminished.

Based on the analysis of the environmental effects of the Project on Indigenous communities, including the analysis of cumulative effects on current traditional uses (Section 6.3), the related mitigation measures described in Sections 5.4, 5.5, 5.9 and 6.1, the potential impacts and the key mitigation, monitoring and follow-up measures described in the Appendix C, the Agency concludes that the severity of the impacts would be high for the following reasons:

- The likelihood of adverse impacts on rights, particularly the right to fish, would be high since the impacts would alter the conditions of traditional practices in a way that would result in changes that would compromise current Indigenous use;
- The Project would result in long-term regional adverse impacts since they would be felt by several Indigenous communities that fish along the St. Lawrence River from Montréal to the estuary. The Project would affect migratory fish species that travel great distances. The decline in numbers would be caused by the loss of habitat that is necessary to the fish life cycle;
- Adverse impacts would be continuous because they would be felt throughout the operational phase of the Project and irreversible since the changes in uses could not return to an initial state considering that the affected fish stocks are already in a precarious state;
- The level of impact on the cultural well-being of some First Nations would be high as it would result in a loss of availability of culturally significant species, namely sturgeon for the W8banaki Nation and striped bass, sturgeon and American shad for the Kahnawà:ke First Nation;
- Cumulative effects on First Nations' rights would be high since the Project would have residual adverse effects on lake sturgeon, Atlantic sturgeon, striped bass and American shad, which are culturally significant species that are also found to be species at risk. The Agency also takes into account the many historical, ongoing and projected projects in the region and the existing level of disturbance in the St. Lawrence River;
- In terms of potential adverse impacts on governance, they could vary from one First Nation to another. Potential changes, perceived by First Nations members, regarding the quality and quantity of resources would affect the relationship to species and more generally the governance of resources by First Nations in a context where many of them have already put in place quotas for the harvesting of targeted species, participate to the recovery of these species or feel that the thresholds allowing them to exercise their rights have already been exceeded. The Mohawk Council of Kahnawà:ke has indicated to the Agency that the implementation of the Project would not be consistent with the application of its traditional laws and that no mitigation or adaptation measures could offset the adverse impacts. The Mohawk Council of Kahnawà:ke raised the point that the exercise of its rights and its culture would be seriously threatened due in part to the cumulative effects of several port projects. The First Nation formally opposed the Project in a letter to the Minister of Environment and Climate Change on December 18, 2020. The Agency notes that the Huron-Wendat Nation, for its part, expressed its support for the Project and that the level of cooperation between the Proponent and Huron-Wendat Nation is high.

7.7 Perspectives on Rights Impact Assessment

Several First Nations have expressed to the Agency and the Proponent their concerns regarding the proper assessment of the Project's impacts on their Aboriginal and treaty rights. The Grand Conseil de la Nation Waban-Aki thus raised its inability to proceed exhaustively with the application of the methodology proposed by the Agency. Innu Frist Nations also mentioned that the approach proposed by the Agency was demanding for the communities given the time available.

To the three paths of impacts on Aboriginal rights (Access-Resource-Experience) identified by the Agency, the Innu First Nations also indicated that, in their opinion, a fourth path, likely to lead to impacts on their rights, should be added: that of the recognition of the importance of the practice of traditional activities for their First Nations by the Aboriginals, the stakeholders in the filed and the governments. According to them, the lack of sufficient recognition of Aboriginal presence and practices, both historical and contemporary, can have an impact on rights, independently of any impact of a project on resources, access or experience.

Moreover, according to the representatives of the Essipit Innu First Nation, the assessment of the impacts of a Project on rights and interests requires an assessment of the cumulative impacts of past development on the ancestral territory, which is lacking in current assessments. For its part, the Mohawk Council of Kahnawà:ke has mentioned to the Agency several times that the absence of a regional study of the St. Lawrence River did not allow it to conduct a complete analysis of the impacts of the Project on their rights.

The new rights impact assessment methodology developed under the *Impact Assessment Act* and applied in the context of this environmental assessment under CEAA 2012 will, according to the Agency, contribute to improving the analysis of impacts on Aboriginal and treaty rights in collaboration with First Nations. The Agency wishes to reiterate its willingness to strengthen its collaboration with Indigenous peoples in the continuous improvement of its processes and its determination to contribute to the Government of Canada's commitments regarding the recognition, protection and respect of the rights of Indigenous peoples.

Concerning the request for a Regional Assessment of the St. Lawrence River Area filed in July 2020 by the Mohawk Council of Kahnawà:ke, as mentioned above, the Agency will initiate an engagement process with First Nations and other interested parties over the coming months. This process aims to conduct a more in-depth analysis of the file and to define the nature, scope, objectives and results of an eventual Regional Assessment. The results of the discussions will be provided to the Minister of Environment and Climate Change in the spring of 2021 so that a final decision on the conduct of a Regional Assessment will be made.

8. Other Considerations

The scope of the Project's environmental assessment under CEAA 2012 is limited to the activities that take place on land owned and controlled by the Proponent. However, during the environmental assessment process, the public, First Nations and experts from federal and provincial governments raised concerns regarding activities associated with the Project that would take place off-port property. This section summarizes concerns to be considered in the Minister's decision.

Concerns relate to the effects of off-site road and rail transportation on air quality and human health in relation to contaminant emissions, noise disturbance, and the potential for accidents and malfunctions.

8.1 Effects of Road and Rail Transportation on Air Quality

The Port of Québec's activities have been the subject of sustained attention by citizens of the borough of La Cité-Limoilou over the past few years regarding air quality. As part of the environmental assessment, the Proponent modelled the effects on air quality of road and rail transportation in the borough of La Cité-Limoilou (Section 5.1). The results show that emissions from these activities would essentially consist of gaseous contaminants from equipment and engines, including land and rail transport, and fugitive dust emissions from paved and unpaved roads. The sources of effects would come, among others, from road transport within the borough of La Cité-Limoilou and from rail transport outside the site and in the Beauport marshalling yard.

In its documents filed on March 31, 2021, the Proponent undertakes to participate actively with the various levels of government in improving the air quality of the environment in the borough of La Cité-Limoilou.

The Proponent also indicates that CN confirmed that Group 4 intermodal locomotives were already in operation and were operating in Quebec, accounting for 35% of its current fleet of intermodal locomotives. In order to reduce greenhouse gas emissions from rail transportation, Environment and Climate Change Canada recommends that the Proponent require CN to use convoy locomotives that meet at least the Tier 4 emission standards of the *Locomotive Emission Regulations*.

Finally, the Proponent also announced that the numerous citizen interventions concerning railway operations in the Québec City area and the issues related to the baseline air quality in the La Cité-Limoilou area have made it possible to meet the initial conditions for setting up a pilot project with CN. This project would consist of deploying two locomotives powered by high-performance batteries in Québec City, ensuring contaminant-free and silent operation. However, this project is still at the stage of analyzing the technical feasibility.

8.2 Effects of the Increase in Road Traffic and Train Length on the Population of the Borough of La Cité-Limoilou and the Greater Québec City Area, Including Lévis

Road Transport

According to the Ministère des Transports du Québec, the items presented by the Proponent do not reveal issues for safety and road traffic, whether during the construction phase or during the operational phase. According to the Proponent, the increase in the total number of vehicles would be scarcely or barely perceptible on the road network during the construction phase, because other transportation modes, such as boat (for materials from the concrete plant) and train (for a large part of the fill materials) would be used. During the operational phase, the Ministère des Transports du Québec considers that the capacity of Boulevard Henri-Bourassa is adequate to accommodate trips by trucks and workers generated by the terminal's operations. For the Boulevard Charest, Autoroute Dufferin-Montmorency and Félix-Leclerc/Dufferin-Montmorency interchange routes, the Ministère des Transports indicates that the increases in total traffic volume would be scarcely to barely perceptible.

However, the Direction de santé publique de la Capitale nationale (DSP-CN) expresses reservations regarding the effects of the increase in truck traffic, which it considers represents safety risks and nuisances for the districts neighbouring the Project, which are densely urbanized and vulnerable. The passage of trucks on Boulevard Charest and Boulevard Henri-Bourassa would increase the risk of accidents and injuries at the intersections, particularly for pedestrians and cyclists. The Ministère des Transports du Québec points out that Ville de Québec should consider prohibiting right turns on red at all intersections where heavy trucks are likely to make such turns. Moreover, it should take the necessary measures so that these intersections are developed safely by allowing more space for cyclists on the roadway and for pedestrians on the sidewalk.

The public is concerned about the proposed traffic route as they pass through residential and highly sensitive areas. Some are concerned about the possibility of a deterioration in noise levels related to road activities, which could lead to sleep disturbances and a reduced sense of well-being. According to them, the increase in trucking on the roads could amplify the congestion problems already observed in the sector and contribute to nuisances in the living environments located near the roads used.

In terms of safety, the public indicates that the risk of collisions with cyclists or pedestrians should be taken into account since several accidents have occurred along the trucking routes proposed by the Proponent. Pedestrians and cyclists are present at intersections and their safety may be put at risk by an increased number of heavy vehicles, with vehicle weight and longer braking distances increasing the risk and severity of collisions.

The MELCC recommends that apart from local deliveries, the only route that should be authorized for trucks to get to Autoroutes 440 and 40 should be Autoroute Dufferin-Montmorency. The Agency points out that this obligation does not rest with the Proponent, which can only encourage truckers to follow this route. However, the Ministère des Transports du Québec points out that Ville de Québec could help the Proponent channel all heavy vehicles during the operational period onto Autoroute Dufferin-Montmorency, by adopting restrictive municipal by-laws for the streets and boulevards under its jurisdiction. The MELCC also recommends that the Proponent deploy a traffic monitoring program for the trucks associated with the Laurentia Project, which would allow surveillance of road accidents in which they are involved. The objective would be to establish the causes and circumstances of these incidents. Démocratie Québec and various individuals and citizens' groups recommend that Ville de Québec prohibit truck through traffic on municipal arteries to reduce the effects related to pollution and noise.

Rail Transport

The Ministère de l'Environnement et de la Lutte contre les changements climatiques (MELCC) is concerned about the consequences of the Project for rail transportation activities under CN's responsibility. Although the Laurentia Project would lead to the passage of only one to two additional trains per day in the operational phase, the length of the trails could increase the nuisances for the neighbourhood, particularly if they circulate at night. Démocratie Québec, the public and various citizens' groups also raised these concerns. The increase in noise levels and vibrations could affect the nearby population, thus triggering sleep disruptions and disturbance.

The public has also raised concerns about the effects of train length on waiting time at crossings. According to Transport Canada, although the Proponent's study identifies three crossings, a total of 13 level crossings on the Bridge Subdivision and two on the Drummondville Subdivision are likely to experience increased use. The impacts would mainly be related to nuisances due to the prolonged activation of warning systems and the occupation of crossings by trains. As for the multifunctional track in Limoilou, a significant impact is anticipated due to prolonged occupation by trains, which could block access and affect emergency services. According to Transport Canada, the warning systems would not have to be modified for the additional trains since they already meet the required basic criteria. Once on Canadian National's major tracks (Montmagny Subdivision, Drummondville (after mile 8.6), Saint-Hyacinthe, Montréal and Kingston), the additional trains would have no impact. The volume of rail traffic varies regularly on these subdivisions, with no impact on safety.

According to the MELCC, Boulevard Père-Lelièvre and Avenue Plante, crossed by a level crossing, are important arteries that would be severely affected during rush hours. According to the Direction de santé publique de la Capitale nationale (DSP-CN), the duration of the blockage over a 9-minute period related to the passage of trains 12,000 ft (3.6 km) long at these two streets would be long enough to cause some motorists to adopt unsafe behaviours (e.g., getting out of line to take another road). This traffic obstruction could also have major impacts for emergency responses.

On the south shore of the St. Lawrence River at Lévis, the Direction de santé publique de Chaudière-Appalaches (DSP-CA), is concerned about the increase in rail transportation that could have consequences for safety and the residents' public health. Depending on the time of passage of the trains, road congestion could result in major obstructions to emergency vehicle traffic and increase response times. The DSP-CA points out that currently no train of this length crosses the level crossings in Charny. The DSP-CA, considers that some citizens would suffer more nuisances related to noise and vibrations caused by the passage of these trains. It must be noted that train traffic in some areas of Charny has already raised complaints for the past several years, particularly due to the sound of the whistles at the level crossing, noise and vibrations caused during the passage of trains (several residences, a secondary school and a library next to the railway right of way in this area) and blocking of road traffic lanes.

The MELCC considers that the Proponent should undertake to assess, in collaboration with CN and the relevant government authorities, the apprehended impacts of blocking of motorists and emergency vehicles and the nuisances caused by rail transportation. The Proponent should take measures to counter or reduce the potentially adverse impacts of the increase in rail transportation related to the Laurentia Project.

The Comité de vigilance ferroviaire de Limoilou points out that the railways that would be used for container transportation is located in a highly urbanized zone. Several citizens' committee, including several neighbourhood councils of Ville de Québec and members of the public, are concerned about the effects of rail transportation in the neighbourhoods that will be crossed. They point out that these neighbourhoods are densely populated and that the tracks are located near homes, schools and other public services. By way of example, the recreation hard of the Saint-Paul-Apôtre elementary school is directly adjacent to the Canadian National right of way. Other schools, such as Jean-de-Brébeuf, are also in this situation, as well as CÉGEP de Limoilou and several CPE childcare centres. The residents are concerned about the risk of accidents and malfunctions related to rail transportation, particularly those related to long trains. Moreover, since the Lac-Mégantic railway disaster, there is a public perception of an increase in the risks of accidents and malfunctions related to rail transportation.

The MELCC specifies that road and rail carriers must have an emergency response plan in compliance with the requirements of the *Transportation of Dangerous Substances Regulation* (Quebec Highway Safety Code) and the *Transportation of Dangerous Goods Regulations*. In addition, traffic of heavy vehicles on Quebec roads is governed by the *Act respecting owners, operators and drivers of heavy vehicles*. The application of these statutes and regulations can ensure safe transportation of dangerous substances and rapid response in case of accidents.

9. Agency Conclusions and Recommendations

In preparing this report, the Agency took into consideration the Proponent's environmental impact study, its responses to information requests, additional information provided in March 2021 as well as advice from government experts and comments from the public and First Nations.

The environmental effects of the Project and their significance, as well as the potential for cumulative environmental effects, have been determined using assessment methods and analytical tools that reflect recognized practices in the filed of environmental and socio-economic assessment.

The Agency concludes that the Project is likely to cause direct and cumulative significant adverse environmental effects as defined in *Canadian Environmental Assessment Act, 2012* on the following components, despite the implementation of mitigation and monitoring measures:

- Fish and fish habitat;
- Air quality;
- Human health;
- The current use of land and resources for traditional purposes, more specifically related to fishing;
- Socio-economic conditions related to recreational and commercial fisheries.

In addition, Fisheries and Oceans Canada considers that the fish habitat offset project would not, under the *Fisheries Act*, adequately offset many of the lost habitats. It would also not ensure the survival or recovery of striped bass, a species protected under the *Species at Risk Act*.

The Agency believes that the Project could have a significant direct and cumulative adverse impact on First Nations' Aboriginal and Treaty rights, including the exercise of fishing rights and related cultural practices.

Also, taking into account the implementation of mitigation measures, the Agency concludes that the Project is not likely to cause significant adverse environmental effects on other components of the environment under federal jurisdiction.

The Agency has identified key mitigation measures and follow-up programs for consideration by the Minister of Environment and Climate Change during his decision regarding the significance of any adverse environmental effects that may result from the Project. If the Minister determines that the Project is likely to cause significant adverse environmental effects, the Minister will refer to the Governor in Council the question of whether these effects are justified in the circumstances. If the Governor in Council determines that these effects are justified in the circumstances, the Minister of Environment and Climate Change will set the conditions for carrying out the Project in his Decision Statement under CEAA 2012. The conditions set out by the Minister would be enforceable.

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Appendices

Appendix A: Criteria for Assessing Environmental Effects

The Agency has developed the following evaluation criteria for the analysis of the significance of environmental effects in the context of the environmental assessment of the Laurentia Project: Port of Québec Deep-Water Wharf - Beauport Sector. Appendix A presents the general definitions of the criteria, the definition of levels for extent, duration, frequency and reversibility (Table 1), the definition of magnitude levels applicable to each of the valued components (Table 2), as well as the grid for determining the significance of environmental effects (Table 3)

General definitions of the criteria used to assess residual effects on each of the valued components (VC)

Magnitude: Indicates the level of disturbance (change) that the studied valued component (VC) would experience. The intensity assessment takes into account the component's ecological context. The intensity can incorporate the concept of the time when the effect would occur, which can refer to a phase of the component's life cycle (migration, reproduction, feeding, etc.) or a period during which a cultural, spiritual or recreational practice by a First Nation or population would occur (e.g., hunting season).

Extent: Geographical extent of the adverse effects.

Duration: Period of time during which the adverse effects will be felt.

Frequency: Pace at which the adverse effects would occur in a given period.

Reversibility: Likelihood of a VC recovering from the adverse effects caused by the Project.

Significance: The significance of the adverse effects is determined by the combination of the levels assigned to each of the criteria (intensity, extent, duration, frequency and reversibility) for each component. A grid for determining the significance of the residual effects on the components is used for this purpose.

Table 18: Definition of levels for each criteria[68]

Assessment criteria	Definition of levels
Extent	**Site-specific**: Effects limited to the Project site. **Local**: Effects extend beyond the Project site but are in the local study area. **Regional**: The effects extend beyond the local study area.
Duration	**Short term or temporary**: The effects will occur over a period of less than one or two years. **Medium term**: The effects would occur over a period of one or two to five years. **Long term**: The effects would occur over a period of more than five years.
Frequency	**Once**: Occurs once in any phase of the Project. **Intermittent**: Occurs occasionally or intermittently during one or more phases of the Project. **Ongoing**: Occurs continually during one or more phases of the Project.
Reversibility	**Reversible**: The VC will recover completely from the Project's effects (e.g., return to the baseline or another target). **Partially reversible**: The VC will partly recover from the Project's effects. **Irreversible**: The VC will not recover from the Project's effects.

[68] These levels apply to all valued components.

Table 19: Definition of magnitude levels for each of the VCs

Levels	Definition of levels for the magnitude criterion
Air quality	
LOW	Anticipated concentrations of contaminants of potential concern (CPC) **and/or** of particulate matter (PM) (baseline state and Project contribution) **would remain far below** Canadian Ambient Air Quality Standards (CAAQS) **and/or** any other national or provincial standards **and/or** other applicable air quality criteria or recommendations; AND The **likelihood** that these concentrations **would have harmful effects** on human health **and/or** on wildlife or wildlife habitat **is low**.
MEDIUM	Anticipated CPC and PM levels (baseline state and Project contribution) **would be below** the CAAQS **and/or** any other national or provincial standards **and/or** other applicable air quality criteria **and/or** recommendations; AND these concentrations **could have harmful effects** on human health **and/or** on wildlife and wildlife habitat.
HIGH	Anticipated CPC **and/or** particulate matter concentrations (baseline state and Project contribution) **would exceed** the CAAQS **and/or** other applicable national **and/or** provincial **and/or** other criteria **and/or** recommendations on air quality; AND/OR these concentrations **could have harmful effects** on human health **and/or** on wildlife and wildlife habitat.
Wetlands	
LOW	In the case of wetlands in "*areas where wetland losses or functional values require that special measures be applied"*[69] **and/or** in an area where wetlands have been designated as having ecological or socio-economic importance:[70] The effects **would not limit or reduce** the ecological or socio-economic functions of wetlands. In the case of wetlands outside of such areas: The effects **would affect** the wetlands and alterations or loss of ecological or socio-economic function are expected in wetlands of **lesser ecological value.**[71]
MEDIUM	In the case of wetlands in "*areas where wetland losses or functional values require that special measures be applied"* and/or in an area where wetlands have been designated as having ecological or socio-economic importance: The effects **would affect** wetlands, **BUT** without causing any **net loss** of wetland ecological or socio-economic functions. In the case of wetlands outside of such areas: The effects **would affect** wetlands and alterations or loss of ecological and socioeconomic functions are anticipated in wetlands **of moderate ecological**.
HIGH	In the case of wetlands in "*areas where wetland losses or functional values require that special measures be applied"* and/or in an area where wetlands have been designated as having ecological or socio-economic importance: The effects would cause a **net loss** of wetland ecological or socio-economic functions. In the case of wetlands outside of such areas: The effects would affect wetlands and alterations or loss of ecological or socioeconomic function are anticipated in wetlands **of high ecological value**.
Fish and fish habitat, including aquatic species and special-status species	
LOW	The effects **would cause little to no disruption** to one or more sensitive phases in the life cycle of fish. In the case of special-status fish:[72] The effects **would not disrupt** the sustainability **and/or** management **and/or** recovery of one or more of these species.
MEDIUM	The effects would **disrupt** one or more sensitive phases of the life cycle of fish, **BUT without harming the sustainability** of the fish population. In the case of special-status fish: Effects on these species **are anticipated, BUT measures** (offsetting or protective) **could be taken** to avoid disrupting the sustainability **and/or** management **and/or** recovery of one or more of these species.
HIGH	The effects would **disrupt** the sustainability of the fish population. In the case of special-status fish: Effects on these species **are anticipated AND no measures** (offsetting or protective) could be taken to reduce the effects.

[69] Taken from: Environment Canada, 1996. Federal Policy on Wetland Conservation Implementation Guide for Federal Land Managers. 23 pages and appendices.

[70] Taken from: Environment Canada, 1991. Federal Policy on Wetland Conservation. 15 pages.

[71] Ecological value: This value must be determined through an analysis of such criteria as surface area, connectivity (natural environments, bodies of water), the diversity of natural communities found there, and disruptions affecting these environments. It tends to illustrate the fragmentation of habitats and ecosystems. Reference: MDDEP (2008), Guide d'élaboration d'un plan de conservation des milieux humides.

[72] Species with federal or provincial special status or those subject to recommendations from the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

Birds and bird habitat, including special-status species	
LOW	The effects **would cause little to no disruption** to one or more sensitive phases in the life cycle of birds. In the case of special-status birds: The effects **would not disrupt** the sustainability **and/or** management **and/or** recovery of one or more of these species.
MEDIUM	The effects would **disrupt** one or more sensitive phases of the life cycle of birds, **BUT without harming the sustainability** of the bird population. In the case of special-status fish: Effects on these species **are anticipated, BUT measures** (offsetting or protective) **could be taken** to avoid disrupting the sustainability **and/or** management **and/or** recovery of one or more of these species.
HIGH	The effects would **disrupt** the sustainability of the bird population. In the case of special-status birds: Effects on these species **are anticipated AND no measures** (offsetting or protective) could be taken to reduce the effects.
Other special-status species	
LOW	The effects **would not disrupt** the maintenace **and/or** management **and/or** recovery of one or more of these species.
MEDIUM	Effects on these species **are anticipated, BUT measures** (offsetting or protective) **could be taken** to avoid disrupting the sustainability **and/or** management **and/or** recovery of one or more of these species.
HIGH	Effects on these species **are anticipated AND no measures** (offsetting or protective) could be taken to reduce the effects.
Risks to human health	
LOW	The potential effects on physical health are related to exposure to contaminant levels that are **well below the applicable standards and criteria** for the protection of physical health. OR Contaminant management and mitigation measures **would minimize residual effects** on noise, air, water, soil, food or quality of life (including for contaminants for which there are no thresholds). OR Potential effects on physical are related to exposure to **low levels of nuisance** (noise, light, vibrations, odours, dust). The effects can be felt by a few individuals. In the case of psychological health : The perception of the risk to health or safety that could be caused by Project-related changes to the environment is **manifested by a few individuals** but is not a concern for many social groups.
MEDIUM	Potential physical health effects are related to exposure to contaminant levels that are **below the applicable standards and criteria** for the protection of physical health, **BUT at moderate levels of nuisance** (noise, light, vibration, odour, dust). The effects may be felt by certain social groups. AND **Residual effects will persist** on noise, air, water, soil, food or quality of life despite contaminant management and mitigation measures (including for contaminants for which there are no thresholds). In the case of psychological health : **Certain individuals and social groups** who would be affected by the Project perceive a risk to their health or safety that could be caused by Project-related changes to the environment **BUT** mitigation or offsetting **measures could be put in place**.
HIGH	Potential physical health effects are related to exposure to contaminant levels that are **above applicable standards and criteria** for the protection of physical health **OR** to **high levels of nuisance** (noise, light, vibration, odour, dust). The effects may be felt by several social groups or a significant portion of the affected population. AND **Residual effects will persist** on noise, air, water, soil, food or quality of life despite contaminant management and mitigation measures (including for contaminants for which there are no thresholds). In the case of psychological health : **Several social groups** that would be affected by the Project perceive a high risk to their health or safety that could be caused by Project-related changes to the environment, **AND no** mitigation or offsetting **measures could be put in place**.
Socio-economic conditions[73]	
LOW	The area is not commonly used for activities. The effects would cause **few changes** to behaviours required for carrying out activities and their economic impact.
MEDIUM	The effects would lead to changes in the behaviours required for carrying out activities **BUT** carrying out activities would **not be compromised** in the most commonly used areas.
HIGH	The effects would lead to **noticeable** changes in the behaviours required for carrying out activities in regularly used areas, such that the activity **would be compromised or no longer possible**.

[73] Definition: all social and economic conditions required for the continuation of activities undertaken by the population affected by the environmental changes caused by the Project (e.g., jobs, education, facilities, housing, infrastructure, community social services and physical community infrastructure, medical and social services, or recreational services and facilities).

Physical or cultural heritage	
LOW	The effects would **slightly alter** the characteristics of the unique nature of an element of the physical or cultural heritage **and/or** of a structure, site or thing of historical, archaeological, paleontological or architectural significance. OR Access to or use of an element of the physical or cultural heritage **and/or** of a structure, site or thing of importance **would not be altered** for users. In the case of designated heritage elements: The effects **would not disrupt** the sustainability **and/or** management of designated heritage elements.
MEDIUM	The effects **would alter** some characteristics of the unique nature of an element of the physical or cultural heritage **and/or** of a structure, site or thing of historical, archaeological, paleontological or architectural significance, **BUT would not compromise its integrity**. OR Access to or use of an element of the physical or cultural heritage **and/or** of a structure, site or thing **would be altered BUT would not be compromised** for users. In the case of designated heritage elements: The sustainability or management of designated heritage elements would be altered **BUT would not alter their designation**.
HIGH	The effects **would lead to the loss** of characteristics of the unique nature of an element of the physical or cultural heritage **or** of a structure, site or thing of historical, archaeological, paleontological or architectural significance, such that **its integrity would be compromised**. OR The effect would **prevent** users from accessing or using an element of the physical or cultural heritage **or** a structure, site or thing of historical, archaeological, paleontological or architectural significance. In the case of designated heritage elements: The effects would **interfere** with the sustainability **and/or** management of designated heritage elements **and** could **compromise their designation**.
Current use[74] of lands and resources for traditional purposes[75] by Indigenous peoples	
LOW	The effects would alter the conditions of traditional practices[76] in a manner **resulting in few changes to current use**. OR The effects involve **few changes to behaviour,** allowing current Indigenous use **to continue**, in preferred ways **or** locations.
MEDIUM	The effects would alter the conditions of traditional practices **without compromising current use**. OR Some behaviours **would be modified**, but current Indigenous use **would not be compromised**.
HIGH	The effects would alter the conditions of traditional practices in a manner **resulting in changes that would compromise current use.** OR Current Indigenous use **would no longer be possible** in accordance with preferred ways **or would be compromised** in the only suitable, available or most preferred locations.

[74] In the context of an environmental assessment, “current use” refers to the manner in which land and resource use may be affected in the course of the life cycle of a proposed project. “Current use” includes active use by Indigenous peoples at the time of the environmental assessment and uses that are likely to occur in a reasonably foreseeable future provided that they have continuity with traditional practices, traditions or customs. Furthermore, uses that may have ceased due to external factors and should also be considered if they can reasonably be expected to resume once conditions change.

[75] Traditional purposes typically relate to activities that are integral to a community’s way of life and culture and have continuity with historic practices, customs and traditions of the community.

[76] A “practice” is a way of doing something that is common, habitual or expected, generally related to activities that are integral to a community’s way of life and culture and offer continuity with historic practices.

“Conditions of practice” are baseline conditions for the practice of activities. Examples of these are quantity or quality of available resources and access to the area.

Table 20: Decision Tree for Determining Overall Significance of a Residual Effect

High Magnitude

Extent	Duration	Frequency	Reversibility/ Irreversibility	Level of Effect	Significance
Regional	Long term	Continuous	Irreversible	High	Significant
			Partially	High	Significant
			Reversible	High	Significant
		Intermittent	Irreversible	High	Significant
			Partially	High	Significant
			Reversible	High	Significant
		Once	Irreversible	High	Significant
			Partially	High	Significant
			Reversible	High	Significant
	Medium term	Continuous	Irreversible	High	Significant
			Partially	High	Significant
			Reversible	High	Significant
		Intermittent	Irreversible	High	Significant
			Partially	High	Significant
			Reversible	High	Significant
		Once	Irreversible	High	Significant
			Partially	High	Significant
			Reversible	High	Significant
	Short term or temporary	Continuous	Irreversible	High	Significant
			Partially	High	Significant
			Reversible	High	Significant
		Intermittent	Irreversible	High	Significant
			Partially	High	Significant
			Reversible	High	Significant
		Once	Irreversible	High	Significant
			Partially	High	Significant
			Reversible	High	Significant

Extent	Duration	Frequency	Reversibility/ Irreversibility	Level of Effect	Significance
Local	Long term	Continuous	Irreversible	High	Significant
			Partially	High	Significant
			Reversible	High	Significant
		Intermittent	Irreversible	High	Significant
			Partially	High	Significant
			Reversible	High	Significant
		Once	Irreversible	High	Significant
			Partially	High	Significant
			Reversible	Moderate	Not Significant
	Medium term	Continuous	Irreversible	High	Significant
			Partially	High	Significant
			Reversible	High	Significant
		Intermittent	Irreversible	High	Significant
			Partially	High	Significant
			Reversible	High	Significant
		Once	Irreversible	High	Significant
			Partially	High	Significant
			Reversible	Moderate	Not Significant
	Short term or temporary	Continuous	Irreversible	High	Significant
			Partially	High	Significant
			Reversible	High	Significant
		Intermittent	Irreversible	High	Significant
			Partially	High	Significant
			Reversible	Moderate	Not Significant
		Once	Irreversible	High	Significant
			Partially	Moderate	Not Significant
			Reversible	Moderate	Not Significant

Extent	Duration	Frequency	Reversibility/ Irreversibility	Level of Effect	Significance
Site-specific	Long term	Continuous	Irreversible	High	Significant
			Partially	High	Significant
			Reversible	High	Significant
		Intermittent	Irreversible	High	Significant
			Partially	High	Significant
			Reversible	High	Significant
		Once	Irreversible	High	Significant
			Partially	High	Significant
			Reversible	High	Significant
	Medium term	Continuous	Irreversible	High	Significant
			Partially	High	Significant
			Reversible	High	Significant
		Intermittent	Irreversible	High	Significant
			Partially	High	Significant
			Reversible	Moderate	Not Significant
		Once	Irreversible	High	Significant
			Partially	Moderate	Not Significant
			Reversible	Moderate	Not Significant
	Short term or temporary	Continuous	Irreversible	High	Significant
			Partially	High	Significant
			Reversible	Moderate	Not Significant
		Intermittent	Irreversible	High	Significant
			Partially	Moderate	Not Significant
			Reversible	Moderate	Not Significant
		Once	Irreversible	Moderate	Not Significant
			Partially	Moderate	Not Significant
			Reversible	Moderate	Not Significant

*Only residual impacts with a "High" effect level demonstrate a significant effect within the meaning of the *Canadian Environmental Assessment Act, 2012*.

Medium Magnitude

Extent	Duration	Frequency	Reversibility/ Irreversibility	Level of Effect	Significance	Extent	Duration	Frequency	Reversibility/ Irreversibility	Level of Effect	Significance	Extent	Duration	Frequency	Reversibility/ Irreversibility	Level of Effect	Significance
Regional	Long term	Continuous	Irreversible	High	Significant	Local	Long term	Continuous	Irreversible	Moderate	Not Significant	Site-specific	Long term	Continuous	Irreversible	Moderate	Not Significant
			Partially	High	Significant				Partially	Moderate	Not Significant				Partially	Moderate	Not Significant
			Reversible	Moderate	Not Significant				Reversible	Moderate	Not Significant				Reversible	Moderate	Not Significant
		Intermittent	Irreversible	High	Significant			Intermittent	Irreversible	Moderate	Not Significant			Intermittent	Irreversible	Moderate	Not Significant
			Partially	Moderate	Not Significant				Partially	Moderate	Not Significant				Partially	Moderate	Not Significant
			Reversible	Moderate	Not Significant				Reversible	Moderate	Not Significant				Reversible	Moderate	Not Significant
		Once	Irreversible	Moderate	Not Significant			Once	Irreversible	Moderate	Not Significant			Once	Irreversible	Moderate	Not Significant
			Partially	Moderate	Not Significant				Partially	Moderate	Not Significant				Partially	Moderate	Not Significant
			Reversible	Moderate	Not Significant				Reversible	Moderate	Not Significant				Reversible	Moderate	Not Significant
	Medium term	Continuous	Irreversible	High	Significant		Medium term	Continuous	Irreversible	Moderate	Not Significant		Medium term	Continuous	Irreversible	Moderate	Not Significant
			Partially	Moderate	Not Significant				Partially	Moderate	Not Significant				Partially	Moderate	Not Significant
			Reversible	Moderate	Not Significant				Reversible	Moderate	Not Significant				Reversible	Moderate	Not Significant
		Intermittent	Irreversible	Moderate	Not Significant			Intermittent	Irreversible	Moderate	Not Significant			Intermittent	Irreversible	Moderate	Not Significant
			Partially	Moderate	Not Significant				Partially	Moderate	Not Significant				Partially	Moderate	Not Significant
			Reversible	Moderate	Not Significant				Reversible	Moderate	Not Significant				Reversible	Moderate	Not Significant
		Once	Irreversible	Moderate	Not Significant			Once	Irreversible	Moderate	Not Significant			Once	Irreversible	Moderate	Not Significant
			Partially	Moderate	Not Significant				Partially	Moderate	Not Significant				Partially	Moderate	Not Significant
			Reversible	Moderate	Not Significant				Reversible	Moderate	Not Significant				Reversible	Low	Not Significant
	Short term or temporary	Continuous	Irreversible	Moderate	Not Significant		Short term or temporary	Continuous	Irreversible	Moderate	Not Significant		Short term or temporary	Continuous	Irreversible	Moderate	Not Significant
			Partially	Moderate	Not Significant				Partially	Moderate	Not Significant				Partially	Moderate	Not Significant
			Reversible	Moderate	Not Significant				Reversible	Moderate	Not Significant				Reversible	Moderate	Not Significant
		Intermittent	Irreversible	Moderate	Not Significant			Intermittent	Irreversible	Moderate	Not Significant			Intermittent	Irreversible	Moderate	Not Significant
			Partially	Moderate	Not Significant				Partially	Moderate	Not Significant				Partially	Moderate	Not Significant
			Reversible	Moderate	Not Significant				Reversible	Moderate	Not Significant				Reversible	Low	Not Significant
		Once	Irreversible	Moderate	Not Significant			Once	Irreversible	Moderate	Not Significant			Once	Irreversible	Moderate	Not Significant
			Partially	Moderate	Not Significant				Partially	Moderate	Not Significant				Partially	Low	Not Significant
			Reversible	Moderate	Not Significant				Reversible	Low	Not Significant				Reversible	Low	Not Significant

*Only residual impacts with a "High" effect level demonstrate a significant effect within the meaning of the *Canadian Environmental Assessment Act, 2012*.

Low Magnitude

Extent	Duration	Frequency	Reversibility/ Irreversibility	Level of Effect	Significance	Extent	Duration	Frequency	Reversibility/ Irreversibility	Level of Effect	Significance	Extent	Duration	Frequency	Reversibility/ Irreversibility	Level of Effect	Significance
Regional	Long term	Continuous	Irreversible	Moderate	Not Significant	Local	Long term	Continuous	Irreversible	Moderate	Not Significant	Site-specific	Long term	Continuous	Irreversible	Moderate	Not Significant
			Partially	Moderate	Not Significant				Partially	Moderate	Not Significant				Partially	Low	Not Significant
			Reversible	Moderate	Not Significant				Reversible	Low	Not Significant				Reversible	Low	Not Significant
		Intermittent	Irreversible	Moderate	Not Significant			Intermittent	Irreversible	Moderate	Not Significant			Intermittent	Irreversible	Low	Not Significant
			Partially	Moderate	Not Significant				Partially	Low	Not Significant				Partially	Low	Not Significant
			Reversible	Low	Not Significant				Reversible	Low	Not Significant				Reversible	Low	Not Significant
		Once	Irreversible	Moderate	Not Significant			Once	Irreversible	Low	Not Significant			Once	Irreversible	Low	Not Significant
			Partially	Low	Not Significant				Partially	Low	Not Significant				Partially	Low	Not Significant
			Reversible	Low	Not Significant				Reversible	Low	Not Significant				Reversible	Low	Not Significant
	Medium term	Continuous	Irreversible	Moderate	Not Significant		Medium term	Continuous	Irreversible	Moderate	Not Significant		Medium term	Continuous	Irreversible	Low	Not Significant
			Partially	Moderate	Not Significant				Partially	Low	Not Significant				Partially	Low	Not Significant
			Reversible	Low	Not Significant				Reversible	Low	Not Significant				Reversible	Low	Not Significant
		Intermittent	Irreversible	Moderate	Not Significant			Intermittent	Irreversible	Low	Not Significant			Intermittent	Irreversible	Low	Not Significant
			Partially	Low	Not Significant				Partially	Low	Not Significant				Partially	Low	Not Significant
			Reversible	Low	Not Significant				Reversible	Low	Not Significant				Reversible	Low	Not Significant
		Once	Irreversible	Low	Not Significant			Once	Irreversible	Low	Not Significant			Once	Irreversible	Low	Not Significant
			Partially	Low	Not Significant				Partially	Low	Not Significant				Partially	Low	Not Significant
			Reversible	Low	Not Significant				Reversible	Low	Not Significant				Reversible	Low	Not Significant
	Short term or temporary	Continuous	Irreversible	Moderate	Not Significant		Short term or temporary	Continuous	Irreversible	Low	Not Significant		Short term or temporary	Continuous	Irreversible	Low	Not Significant
			Partially	Low	Not Significant				Partially	Low	Not Significant				Partially	Low	Not Significant
			Reversible	Low	Not Significant				Reversible	Low	Not Significant				Reversible	Low	Not Significant
		Intermittent	Irreversible	Low	Not Significant			Intermittent	Irreversible	Low	Not Significant			Intermittent	Irreversible	Low	Not Significant
			Partially	Low	Not Significant				Partially	Low	Not Significant				Partially	Low	Not Significant
			Reversible	Low	Not Significant				Reversible	Low	Not Significant				Reversible	Low	Not Significant
		Once	Irreversible	Low	Not Significant			Once	Irreversible	Low	Not Significant			Once	Irreversible	Low	Not Significant
			Partially	Low	Not Significant				Partially	Low	Not Significant				Partially	Low	Not Significant
			Reversible	Low	Not Significant				Reversible	Low	Not Significant				Reversible	Low	Not Significant

*Only residual impacts with a "High" effect level demonstrate a significant effect within the meaning of the *Canadian Environmental Assessment Act, 2012*.

Appendix B: Assessment of Residual Adverse Environmental Effects – Summary

Note: The information presented in Chapter 5 takes precedence over the information presented in this appendix.

Table 21: Summary of residual adverse environmental effects

Potential residual effects	Characterization of potential residual effects	Significance of Potential Residual Adverse Environmental Effects
Effects on air quality		
During construction: increase in the concentration of particulate matter (TPM, PM_{10} and $PM_{2.5}$), nitrogen dioxide, formaldehyde and nickel in the atmosphere beyond the RAA or CAAQS standards. **During operation**: increase in the concentration of total particulate matter (TPM), fine particulate matter ($PM_{2.5)}$, nitrogen dioxide, acetaldehyde and nickel above the RAA or CAAQS standards. Exceedances in all areas of interest and at sensitive receptor locations in the study area for fine particulate matter ($PM_{2.5)}$ (construction and operation), the 2025 hourly CAAQS for nitrogen dioxide (NO_2) (construction and operation), and the RAA standard for nickel (construction). Slight infrequent exceedances (generally in the range of 0-2% of the time) in some areas of interest and at some sensitive receptor locations for the daily standards for particulate matter ($PM_{2.5}$, TPM and PM_{10}) and NO_2, and the 15-minute standard for formaldehyde. Slightly more frequent exceedances (up to 10% of the time) in the Baie de Beauport recreational zone.	**Magnitude**: High – The atmospheric contribution of the Project would increase the concentrations of contaminants of potential concern to exceed the CAAQS[77] (2020-2025) or the criteria of the AAR[78] in a environment where exceedances already exist. **Scope**: Regional – Effects would extend beyond the local study area (airshed area) **Duration**: Long-term – Effects would last over the life of the Project. **Frequency**: Continuous **Reversibility**: Irreversible	**Important** Hight residual effect level. The additional contribution of the Project in an environment where air quality is already significantly affected, particularly with respect to total particulate matter, fine particulate matter, nitrogen dioxide and nickel, is likely to result in a significant deterioration of air quality in the surrounding residential neighbourhoods and public areas.
Transboundary effects (greenhouse gases)		
• Emissions of approximately 20,000 tons of CO_2 equivalent per year.	Low contributions of the Project's direct and indirect emissions to provincial or national emissions. Direct emissions below the threshold of the reporting programs of the governments of Canada and Quebec.	**No Important** Greenhouse gas emissions would not contribute significantly to provincial or national emissions.
Wetlands		
• No loss or disruption of wetland functions anticipated.	No loss or disruption of wetland functions.	**No Important** As the Project would avoid all wetlands, a follow-up will be necessary to verify the accuracy of the environmental assessment.

[77] CAAQS: Canadian Ambient Air Quality Standards
[78] RAA: *Regulation respecting the purification of the atmosphere* of the Government of Quebec

Potential residual effects	Characterization of potential residual effects	Significance of Potential Residual Adverse Environmental Effects
Fish and fish habitat, including aquatic invertebrates and special status species [79]		
Destruction and Permanent Alteration of Fish and Aquatic Invertebrate Habitat : • 21.4 hectares of important and sensitive habitat for striped bass, lake sturgeon, Atlantic sturgeon and American shad affected by the Project. o Loss of striped bass and American smelt breeding habitat, loss of feeding and movement habitat for both sturgeon species. Loss of rearing and breeding habitats for American shad. o Loss of habitat for the Hickorynut. o Hydraulic changes significantly affecting certain fish habitat functions. Changes in water quality related to dredging and sediment management : • Activities during the construction and operational phase could adversely affect water quality and fish habitat by adding suspended solids and contaminants. • Sound and light during the night could be harmful to fish. • Mitigation measures would be sufficient to ensure that fish are not harmed.	**Intensity**: High – The Project would adversely affect the sustainability of the population of several fish species and no measures (avoidance, mitigation or offsetting) could be put in place to significantly mitigate the effects on these species. **Extent**: Regional – The most affected species are migratory populations, which have a regional geographic distribution and travel great distances. **Duration**: Long term – Many habitats would be permanently lost without the possibility of offsetting. **Frequency**: Continuous **Reversibility**: Irreversible	**Important** High residual effect level. The destruction and permanent modification of important habitats for several species of fish would have consequences on the sustainability of populations of species that are already fragile. The destruction of breeding habitat for striped bass, an endangered species according to the *Species at Risk Act* (Schedule 1), could not be offset and could hinder the recovery of the species.
Birds and bird habitat, including special status species		
Habitat loss and disturbance : • Permanent loss of 7.5 hectares of terrestrial bird habitat and 13.7 hectares of aquatic encroachment. • Loss of habitat used during spring and fall migration for several species of waterfowl, including shorebirds. The shorebird offset project would reduce the effects during migration. Disturbance by noise, traffic and night lighting : • Low disturbance by noise and traffic. • Mortality risks in case of collision with structures : • Low risk of bird mortality in case of collision with structures. *Species at Risk Act* : • The construction and maintenance of artificial bank swallow nesting boxes would allow the species to breed and continue to use this habitat; • Unlikely to have harmful effects on barn swallows, common Nighthawk, chimney sweeps and peregrine falcons.	**Intensity**: Low – Effects would have little effect on one or more important phases of the birds' life cycle. **Scope**: Local – Effects would extend beyond the Project site but would be within the local study area. **Duration**: Long term – Habitat losses would be permanent. **Frequency**: Continuous **Reversibility**: Irreversible	**No Important** Moderate level of residual effect. The Project is not likely to cause significant adverse effects on terrestrial and aquatic bird species, provided that all key mitigation measures are implemented.

[79] Species of special status include species listed under federal and provincial legislation. Effects on species at risk are assessed under section 79 of the *Species at Risk Act* and include species for which the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) recommends that their status be changed or added to the list of species at risk.

Potential residual effects	Characterization of potential residual effects	Significance of Potential Residual Adverse Environmental Effects
Other special status species (other than fish or birds)		
• An industrialized environment that supports mostly marginal, disturbed and small area habitats. The inventories carried out on certain species with special status have not detected their presence. *Species at Risk Act* : • Unlikely to have harmful effects on Victorin's water-hemlock, Victorin's gentian, common map turtle, snapping turtle and monarch.	**Intensity**: Low – Effects would not adversely affect the sustainability, management, or recovery of one or more of these species. **Scope**: Site-specific – Effects would occur at the Project site. **Duration**: Long-term – Effects would occur throughout the life of the Project. **Frequency**: Continuous **Reversibility**: Partially reversible	**No Important** Low level of residual effect. The Project is not likely to have significant adverse effects on special status species (other than fish or birds).
Human health (physical and psychological)		
• Existing exceedances observed in the receiving environment for certain contaminants, including particulate matter, NO^2 and nickel. • Project located near a residential sector and a vulnerable population with social inequalities in health. • Potential health risks, including those related to air quality and more specifically the additional cancer risk generated by the Project for particulate matter from diesel engines. • Uncertainties inherent in air contaminant dispersion modelling and human health risk assessment. • Project-generated emissions of contaminants of potential concern or particulate matter that would approach or exceed the NAAQS or MELCCAR criteria[80].	**Intensity**: High – exceedances of concentrations of contaminants of potential concern could result in potential human health effects on vulnerable populations in the area. **Scope**: Local – Risks to human health would extend beyond the site area (airshed area). **Duration**: Long-term – Effects would occur throughout the life of the Project. **Frequency**: Continuous **Reversibility**: Partially reversible to irreversible, depending on the type of risk.	**Important** Strong residual effect level. The Project would contribute to the degradation of air quality in a living environment where several environmental and socio-economic risk factors for health are already present and known.
Socio-economic conditions		
Recreational and tourist activities and access to the St. Lawrence River : • Loss of area of the Baie de Beauport recreational and tourist use zone; • Practice of recreational tourism activities would not be compromised. Recreational and commercial fishing : • Change in recreational and commercial fishing practices due to the potential effects on fish and fish habitat, the impossibility of offsetting some habitats (striped bass) and the great difficulty of offsetting others (lake sturgeon and Atlantic sturgeon); • Socio-economic importance of fish and fish habitat, including investments from governments (reintroduction, recovery and monitoring programs). Intensification of maritime traffic : • Addition of approximately 156 vessels.	**Intensity**: High – The effects would result in significant changes in the behaviours related to recreational and commercial fishing in areas that are regularly fished, in such way that they are compromised. **Scope**: Regional – The most affected species are migratory populations. **Duration**: Long term – Many habitats would be permanently lost and no measures could be put in place to significantly reduce these effects. **Frequency**: Continuous **Reversibility**: Irreversible	**Important** Strong residual effect level. Negative effects and uncertainties affecting fish and fish habitat could have significant effects on recreational and commercial fishing.

[80] MELCC: Ministry of the Environment and the Fight against Climate Change.

Potential residual effects	Characterization of potential residual effects	Significance of Potential Residual Adverse Environmental Effects
Indigenous Peoples - Current Uses of Lands and Resources for Traditional Purposes		
Fishing and hunting activities : • Fishing activities could be jeopardized due to potential effects on several prized fish populations already at risk: • The Huron-Wendat Nation: the activities and customs surrounding the striped bass, lake sturgeon and Atlantic sturgeon fishery; • The W8banaki Nation: activities and customs surrounding the lake and Atlantic sturgeon fishery and future striped bass fishing opportunities; • The First Nations of Essipit, Pessamit and Pekuakamiulnuatsh, more specifically the Essipit Innu: activities and customs surrounding Atlantic sturgeon fishing and future striped bass fishing opportunities; • The Wolastoqiyik (Maliseet) Wahsipekuk Nation: activities and customs surrounding the Atlantic sturgeon fishery; • Mohawk First Nations, including Kahnawà:ke First Nation: activities and customs surrounding the lake sturgeon and American shad fishery and future striped bass fishing opportunities. Changes in access and land use : • Disruption of activities by disturbance, noise and increased vessel traffic.	**Intensity**: High – The Project would change the conditions of traditional practices in a way that compromise the striped bass, lake sturgeon, Atlantic sturgeon and American shad fisheries. **Scope**: Regional – The effects would be felt by several Indigenous communities fishing migratory species along the St. Lawrence River. **Duration**: Long term – Fishing practice would be affected by the decrease in affected fish populations. **Frequency**: Continuous – Effects would occur throughout the operational phase. **Reversibility**: Irreversible – It is unlikely that current use can return to an initial state considering that the affected fish stocks are already precarious.	**Important** High residual effect level. The Project's effects on fish and fish habitat could reduce the fish stocks prized and fished by First Nations. Potential impacts on the practice of fishing activities as well as on the activities and customs surrounding this practice are expected.
Physical or cultural heritage and effects on sites, structures or locations of historical, archaeological, paleontological or architectural significance		
Landscape : • Sector characterized by port and industrial infrastructures, with a capacity to absorb new infrastructures; • The visual influence of the infrastructure would generally be low. • First Nations Historical and Cultural Heritage : • Construction and operation activities would not threaten the integrity of First Nations heritage and cultural sites. • Terrestrial and underwater archaeology : • The application of a contingency plan for underwater archaeological resources would be required.	**Intensity**: Medium – The effects would result in the modification of certain landscape features without compromising the integrity of the physical and cultural heritage, or something of archaeological significance, and would not interfere with the maintenance or management of heritage features. **Scope**: Local – Effects would occur in the local study area. **Duration**: Long-term – The effects would be permanent. **Frequency**: Continuous **Reversibility**: Irreversible	**Not important** Moderate level of residual effect. The Project is not likely to cause significant residual adverse environmental effects, taking into account the implementation of key mitigation measures.

Appendix C: Mitigation Measures, Monitoring and Follow-Up Considered by the Agency

Table 22: Key mitigation and monitoring measures identified by the Agency

Valued Component	Mitigation Measures, Monitoring and Follow-Up
Air Quality	**Mitigation Measures** <u>For the construction phase</u> • Use rail transportation (instead of trucking) to import the majority of fill material to the job site; • Use, during construction phase, zero-emission equipment and vehicles or, if a particular zero-emission equipment or vehicle is not available or not technically or economically feasible, use a low-carbon or diesel fuel equipment or vehicle that meets, at a minimum, Tier 4 emission standards; • Reduce the size, power and operating time of equipment required for construction; • Reduce wind erosion and airborne particulate emissions: o Clean or water surfaces and spoil in the construction area (including areas where stripping and grading activities take place, backfill unloading area and traffic areas, spoil on site and in railcars) to reduce dust generation and transport beyond the Proponent's property boundaries; o Stabilize or quickly restore the work area to avoid wind erosion. When soils are excavated, continuously backfill exposed soils or cover them with impermeable covers as soon as the work is completed (daily) to limit wind erosion or rain leaching. Pay particular attention to wind erosion when preparing the site and when laying out the vegetated slope; o Cover with tarpaulins any loads that may release particles into the air; o Cover dikes, settling pond walls, piles of material (gravel and sand) and dredged sediments with waterproof tarps. Ensure that the impermeable covers are effective; o Use dust suppressants that comply with the BNQ 2410-300 standard of the Bureau de Normalisation du Québec to reduce the emission of particles into the air; o Paving the entire site in the shortest possible time; o Do not handle granular materials in high winds or when the wind is blowing towards sensitive receptors; otherwise use dust suppressors to minimize dust generation. The Proponent must measure wind speed and, when the wind reaches 19 kilometres per hour or more, measures must be put in place to reduce wind erosion. The Proponent must implement concrete measures to enforce these measures; o Limit the height at which the material is unloaded and the distance over which it will fall freely to reduce the emission of particles into the air; o Immediately stop construction activities if conditions could result in dust and contaminant emissions to sensitive receptors (activities could then be moved to another area); o Install and regularly maintain dust collectors or devices to reduce particulate emissions in areas where operations may generate dust. • Optimize the logistics of equipment movement to control transportation in order to avoid unnecessary emissions and increase efficiency of use (develop an efficient road routing system on the worksite, schedule vehicle and equipment movements and work methods to minimize time and distances travelled); • Minimize container loading and unloading times during construction phase; • Limit vehicle travel speeds to less than 15 kilometres per hour and put in place concrete measures to enforce these measures; • Operate switching locomotives to transfer cars from the Project's train loading area to CN's Beauport rail yard that meet, as a minimum, the Tier 4 emissions standards as set out in the *Locomotive Emission Regulations*; • Implement a Policy prohibiting idling of engines using fuels and put in place concrete measures to enforce these measures; • Implement specific mitigation measures for the use of the concrete plant: o Install the concrete plant in an area where exposure to prevailing wind is minimal; o Install and maintain dust collectors on a regular basis; o Stored all granular materials with a particle size of less than 3 millimetres (bulk cement, bentonite and similar fine dry materials) required for the concrete plant in silos; o Maintain a high moisture content of the aggregates to reduce particulate emissions to the air through wind erosion; o Use all effective means to protect aggregate piles or other materials from wind to prevent wind erosion; o Arrange piles (shape/geometry) to minimize the exposed surface area of aggregate stockpiles and reduce wind erosion. For example, use windproof fences/screens or platforms below ground level; o Minimize the number of raw material transfer points and close them partially or completely; <u>For the operational phase</u> • Acquire and use port equipment equipped only with electric motors rather than hybrid (electric/diesel) motors corresponding to what was used for air emission modelling. This will include, the following equipment: quay gantry cranes, rail cranes and cantilever rail cranes; • Use electric tractor units, horizontal transport vehicles, stacking cranes and empty container handlers during operational phase or, if an equipment or vehicle is not available in electric form or its use is not technically or economically feasible; • Minimize container loading and unloading times during operational phase; • Keep traffic areas clean to minimize dust generation after trucks pass by; • Maintain driveways and running surfaces, and repair surfaces when required; • Maintain vehicles and equipment according to the manufacturer's specifications to keep them in good working order. Ensure that emission control technologies are not removed from the vehicle or equipment, unless their removal is necessary for repair and maintenance activities, after which they must be reinstalled or replaced before the vehicle or equipment is returned to service; • Use trucks that are in good working order and meet ECCC on-road and off-road emission the most up-to-date standards; • Carry out a preliminary and regular inspection of the machinery to ensure its good condition and proper operation, particularly the exhaust and anti-pollution systems;

Valued Component	Mitigation Measures, Monitoring and Follow-Up

- Limit the speed of vehicles to less than 15 km/h and put in place concrete measures to enforce these measures;
- Operate switching locomotives that meet, as a minimum, the Tier 4 emissions standards as set out in the *Locomotive Emission Regulations*;
- Implement during construction and operational phases a Policy prohibiting idling of engines using fuels for mobile equipment and road vehicles in the Project area and requiring all persons to comply with this policy, unless there are health or safety constraints;
- Provide incentives for container trucking to use the Félix-Leclerc and Dufferin-Montmorency highways. Truckers should only use Henri-Bourassa Boulevard for local deliveries or when traffic on the above-mentioned highways is diverted. In an annual report, the Proponent specifies the proportion of trucks that used Félix-Leclerc and Dufferin-Montmorency highways to reach or leave the Project during the reporting year;
- Encourage train operators serving the Project with locomotives equipped with automatic shutdown and restart devices to use these devices while on the construction site to limit engine idling, unless weather and/or health or safety constraints exist;
- Establish monitoring and communication practices to issue warnings to vessels discharging excessive amounts of smoke. The Proponent documents observed smoke events and any actions taken by the Proponent in response to each smoke event;
- Install and maintain the necessary equipment for the electrical connection to the ships' berths as provided for in the design measures of the Project;
- Develop, prior to operation and in consultation with Environment and Climate Change Canada, and implement life cycle air emission reduction plan for various contaminants, including specific non-threshold contaminants associated with engine exhaust including diesel particulate matter, for the life of the Project. This plan should specify reduction measures to be implemented and quantifiable targets.

Monitoring and Follow-up

Develop, in consultation with Environment and Climate Change Canada and the Ministère de l'Environnement et de la Lutte contre les changements climatiques, and implement a follow-up program to verify the accuracy of the environmental assessment and to assess the effectiveness of mitigation measures with respect to the adverse environmental effects of air quality changes caused by the Project during construction and operation. Proponent shall :

- Install, prior to construction and taking into account the Ministère de l'Environnement et de la Lutte contre les changements climatiques' *Air Quality Monitoring Station Guidelines* and the Canadian Council of Ministers of the Environment's *Ambient Air Quality Monitoring Protocol* for $PM_{2.5}$ and Ozone, new sampling stations to monitor:
  - Air quality from the Project in the Beauport Bay recreational and tourism area;
  - Air emissions from the concrete plant;
  - Air quality in the surrounding residential areas.
- Monitor, during construction and at a frequency determined during the development of the monitoring program, the concentrations of fine particulate matter ($PM_{2.5}$), inhalable particulate matter (PM_{10}), total particulate matter (TPM), acetaldehyde, formaldehyde, nitrogen dioxide, and nickel at the sampling stations used in the environmental assessment and at the new stations. Compare the monitoring results to the most restrictive criteria for each of the contaminants between the Canadian Council of Ministers of the Environment's Canadian Ambient Air Quality Standards and Quebec's *Clean Air Regulation*;
- Monitor dust deposition during the construction phase at least during the periods when a maximum of dust would be emitted;
- Monitor at a specified frequency during operation concentrations of fine particulate matter ($PM_{2.5}$), inhalable particulate matter (PM_{10}), total particulate matter (TPM), acetaldehyde and nitrogen dioxide at the sampling stations used for the environmental assessment and at new stations. Consider the nature of the activities carried out and representative activity and traffic periods;
- Compare the monitoring results to the most restrictive criteria for each of the contaminants between the Canadian Council of Ministers of the Environment Canadian Ambient Air Quality Standards and the *Clean Air Regulation* and, for inhalable particulate matter (PM_{10}), to World Health Organization standards. Also compare the monitoring results for these contaminants with the results of the modelling carried out by the Proponent as part of the environmental assessment;
- Compare the monitoring of dust deposition to the monthly standard for dust deposition set out in Ontario's *Air Pollution - Local Air Quality Regulation* (419/05);
- Publish monitoring results on the Internet in a manner that allows real-time visualization of changes in air quality from previous periods and demonstration of how the results compare to the target air quality criteria and to the results of the modelling carried out by the Proponent as part of the environmental assessment;
- Develop and implement modified or additional mitigation measures if monitoring results demonstrate that modified or additional mitigation measures are required to maintain concentrations of fine particulate matter ($PM_{2.5}$), inhalable particulate matter (PM_{10}), total particulate matter (TPM), formaldehyde, nitrogen dioxide, acetaldehyde, and nickel, and dust depositions below the values modelled in the environmental assessment;
- Update the follow-up program for the operation based on the monitoring results and according to a schedule determined at each review in consultation with the parties consulted in the development of the follow-up program;
- If monitoring results demonstrate air degradation in La Cité-Limoilou during operation, develop and implement, in consultation with the Comité intersectoriel sur la contamination Environnementale dans l'arrondissement La Cité-Limoilou (or any equivalent stakeholder that aims to improve air quality in La Cité-Limoilou), modified or additional mitigation measures to mitigate the environmental effects of the changes to air quality caused by the Project;
- Develop and submit to the Agency, prior to construction, a protocol for receiving complaints about air emissions from the Project, and implement it during construction and operation. The Proponent shall submit the protocol to the Agency prior to construction. As part of the implementation of the protocol, the Proponent shall:
  - Responds to any feedback received within 48 hours of receipt and implements any corrective action under its control to mitigate air emissions from the Project as soon as technically feasible;
  - Make public a record of all feedback received during the year and any corrective actions it has implemented or plans to implement.
- Develop, prior to operation and in consultation with Environment and Climate Change Canada, and implement during operation, an Air Emissions Reduction Plan aimed at continuous improvement in the reduction of air emissions, including greenhouse gases, from all of the Proponent's port activities, including greenhouse

Valued Component	Mitigation Measures, Monitoring and Follow-Up
	gases, non-threshold contaminant emissions associated with engine exhaust (including diesel particulate matter) and concentrations of fine particulate matter ($PM_{2.5}$), inhalable particulate matter (PM_{10}), total particulate matter (TPM), acetaldehyde and nitrogen dioxide. As part of the plan development, define quantifiable emission reduction goals that target carbon neutrality and identify the reduction measures that will be implemented to achieve these goals during any phase of the Project. As part of the implementation of the plan the Proponent shall: o Make public the inventory of air emissions covered by the plan from all of the Proponent's port activities; o Report on progress in reducing air emissions; o Determine in consultation with Environment and Climate Change Canada, after the fifth year of operation and thereafter according to the schedule determined at each review. If the Proponent revises the plan, the Proponent shall submit any revised plan to the Agency and Environment and Climate Change Canada within 30 days of the revision of the plan. • Continue to implement and participate, throughout the duration of the Project and in consultation with the Comité intersectoriel sur la contamination environnementale dans l'arrondissement de La Cité-Limoilou, in initiatives aimed at the continuous improvement of air quality in the borough of La Cité-Limoilou.
Transboundary Environmental Effects - Greenhouse Gas Emissions	**Mitigation measures** <u>Construction phase</u> • Maintains all vehicles and equipment according to the manufacturer's specifications to keep them in good operating condition and ensures that emission control technologies are not removed from the vehicle or equipment unless their removal is necessary for repair and maintenance activities, after which they must be reinstalled or replaced before the vehicle or equipment is returned to service; • Use zero-emission equipment and vehicles or, if zero-emission equipment or vehicles are not available or their use is not technically or economically feasible, provide the Agency with a rationale for this determination and use low-carbon fuel or diesel equipment or vehicles that meet, at a minimum, the Tier 4 emission standards; • Use rigorous planning to optimize operating time; <u>Operational phase</u> • Optimizing loading and unloading operations at the terminal (automation and programming of logistic sequences), allowing in particular a significant reduction in the movement of mobile equipment on-site (reducing the energy consumption of hybrid equipment); • Develop, in consultation with the competent authorities, and implement a greenhouse gas emissions reduction plan for the life of the Project. This plan should specify reduction measures to be implemented and quantifiable targets in order to achieve carbon neutrality during the construction and operation of the Project. **Monitoring and Follow-up** • Monitor the greenhouse gas emissions emitted by the Project during construction and operation at a frequency that takes into account the nature of the activities carried out under the Project and representative periods of activity and traffic. Compare the results of this monitoring to the objectives defined during the development of the monitoring program; • Review periodically the frequency at which monitoring is conducted, taking into account the volume of Project operations. Conduct any subsequent monitoring at the revised frequency, as appropriate; o Develop and implement modified or additional mitigation measures if monitoring results demonstrate that modified or additional mitigation measures are required to reduce greenhouse gas emissions from the Project and to achieve the objectives identified in the follow-up program. o At each revision of the monitoring program applicable to the operational phase, revise the targets defined in consultation with the parties that have been consulted. Implement the updated monitoring program.
Wetlands	**Monitoring and Follow-up** • Develop, prior construction and in consultation with Environment and Climate Change Canada and the Ministère de l'Environnement et de la Lutte contre les Changements cliamtiques, and implement a monitoring program for wetlands and their functions; • Update baseline status (Englobe, 2018c) of wetlands and wetland ecological functions prior to commencement of work; • Conduct follow up in operating years 1, 3, 5, 7 and 10; o Monitor the evolution of the ecological functions, area, boundaries, plant communities and floristic composition of wetlands numbers 1 (bulrush marsh), 2 (broad-leaved Sagittarius marsh) and 3 (zizany marsh) identified in Figure 7 of the Environmental Assessment Report by taking into account the principles of the simplified botanical method of the Identification et delimitation des milieux humides du Québec meridional de 2015 guide of the Ministère de l'Environnement et de la Lutte contre les changements climatiques du Québec and by documenting the plant species present (including new species and invasive alien plant species) and the percentage of cover of each of these species; o The composition of the substrate; o Interannual changes between each year for which monitoring is conducted and relative to reference conditions. • In the event that negative effects on wetlands are detected during monitoring, including the introduction of invasive alien species, propose, in consultation with the competent authorities, adaptive management measures such as offsetting measures in order to meet the objective of no net loss of wetland functions of the Federal Policy on Wetland Conservation; • Following the results of the monitoring determine, in consultation with Environment and Climate Change Canada and the Ministère de l'Environnement et de la Lutte contre les changements climatiques, whether the monitoring should continue beyond 10 years; • Develop, prior to operations and in consultation with Environment and Climate Change Canada and the Ministère de l'Environnement et de la Lutte contre les changements climatiques, a morpho-sedimentological monitoring program that will make it possible to track the evolution of erosion processes and quantify coastal sedimentary movements. The morpho-sedimentary monitoring should make it possible to analyze the hydrosedimentary behavior of the beach following the completion of the Project and to determine whether the sedimentary balance corresponds to that predicted in the Lasalle NHC report (2020). The follow-up should also documents the effects of the Project on the surrounding wetlands, particularly those of the southwestern entrance to Bay of Beauport; o Conduct follow-up in operating years 1, 3, 5, 7 and 10;

Valued Component	Mitigation Measures, Monitoring and Follow-Up
	○ In the event that negative effects on wetlands are identified during the follow-up, propose, in consultation with Environment and Climate Change Canada and the Ministère de l'Environnement et de la Lutte contre les changements climatiques, adaptive management measures to reduce the effects of the Project; ○ In the event that monitoring results show phenomena (e.g., erosion or sediment displacement) that are more intense than anticipated, determine in consultation with Environment and Climate Change Canada and the Ministère de l'Environnement et de la Lutte contre les changements climatiques whether parameters should be added to the monitoring program or measures should be applied to reduce the intensity of these phenomena; ○ Following analysis of monitoring results, determine in consultation with Environment and Climate Change Canada and the Ministère de l'Environnement et de la Lutte contre les changements climatiques, if monitoring should continue beyond 10 years.
Fish and fish habitat, including aquatic invertebrates and special status species	**Mitigation measures** <u>Specific measures for fish</u> • Carry out interventions in water outside sensitive periods for fish, particularly striped bass, Atlantic sturgeon, lake sturgeon, American shad, and American smelt. Determine these sensitive periods in consultation with the competent authorities and limit the duration of the work in the aquatic environment to the minimum; • Carefully recover all the captive fish in the confined or isolated sections of the work site and return them immediately to the aquatic environment, in a sector favouring their survival, to avoid any fish mortality; • During placement of piles: ○ Recover the drilling mud and deposit in a terrestrial environment; ○ Use vibration instead of hammering, unless this is not technically feasible. Start the piledriving work to allow the fish to leave the immediate area of the work. Gradual startup should begin with minimum machine power, gradually increasing to optimum power; ○ If a shutdown longer than 20 minutes is anticipated between two piledriving periods, repeat the gradual startup procedure; • Gather and relocate the freshwater mussels with special status before construction of the containment dike while avoiding the release of exotic species. In consultation with the competent authorities and before the work, determine the areas where this collection is necessary, identify the host site favourable to the species, and determine the gathering and relocation methods; • In consultation with Fisheries and Oceans Canada, determine the areas where hickorynuts are likely to be found. Develop and conduct an inventory to detect their presence and, as applicable, relocate the individuals in an adequate habitat for the species. • Inspect any equipment required for in-water construction, including dredges and other watercraft, before the equipment is used in the work area to ensure that it is free of aquatic alien invasive species. The Proponent shall document the results of any inspections conducted. <u>Measures specific to work in the aquatic environment and sediment management</u> • Use biodegradable hydraulic oils for machinery used for backfilling the pier, with the exception of trucks, which could use conventional hydraulic oils; • Characterize, pre-construction, sediments in the area or Pier 53 to determine the presence or absence of butyltins: ○ Determine, in consultation with Environment and Climate Change Canada and the Ministère de l'Environnement et de la Lutte contre les changements climatiques, the location, the number and depth of samples; ○ If the presence of butyltins is confirmed, in consultation with Environment and Climate Change Canada and the Ministère de l'Environnement et de la Lutte contre les changements climatiques : ▪ Determine the area and depth of butyltin contaminated sediments; ▪ Determine and implement dredging and management methods to ensure that butyltin contaminated sediments are properly managed. • Maintain recognized and effective devices during in-water construction to girdle work areas so as not to exceed the suspended solids management criteria set forth in the Recommendations for the Management of Suspended Solids (SS) During Dredging Activities (MELCC and ECCC 2016), to prevent suspended sediments from adversely affecting Beauport Bay; • Prior to the commencement of the dredging required for the construction of the Project, develop and implement measures to reduce emissions of contaminants and suspended solids to the environment, including: ○ During the transport and deposition of sediments; ○ For the management of dredged material and dewatering water. • Mechanically dredge contaminated sediments using the dredging cone method or any other equivalent method that targets the contaminated sediments that need to be dredged. ○ Dredge an additional 30 centimetres around the area of contaminated sediment and manage it as contaminated sediment; ○ Use an impervious bucket when dredging contaminated sediment; ○ Minimize the distance between the dredge bucket and the barge to the lowest technically feasible distance when filling the barge; ○ Once the dredging of the contaminated sediments is completed, carry out an additional dredging passage (clean-up passage) to recover contaminated sediments that may have settled on the bottom; ○ Complete a visual inspection of the particle size and colour of the dredged material from the dredging to verify that all contaminated sediments have been dredged; ○ Install a transshipment flap at Pier 49 to prevent mechanical dredged material from being resuspended during transshipment. • Delineate, before dredging begins, the areas in which dredging will be undertaken. The Proponent shall not undertake any dredging outside these areas ; • Construct a watertight basin at the location of the sediment transfer between the barge and the transport trucks (parcel 4), over which it transfers any mechanically dredged sediment in order to recover the dredged material and water before it reaches the aquatic environment;

Valued Component	Mitigation Measures, Monitoring and Follow-Up
	• Identify and implement, in consultation with Environment and Climate Change Canada, mitigation measures to limit the risk of concrete or contaminant spills into the aquatic environment during the fabrication of concrete caissons on the submersible barge; • Install and use, if needed, a mobile treatment unit to treat the effluent from the contaminated sediment settling pond prior to discharge into the municipal sewer in order to comply with municipal regulatory obligations related to the quantity and quality of water discharged into the sewer systems and waterways on the territory of the agglomeration of Québec City; • Develop, before the start of the first required maintenance dredging, a protocol for the characterization and management of sediments that will be dredged during maintenance dredging. In developing the protocol, the Proponent must: o Identify how the Proponent will carry out in situ characterization of the sediments to determine their contamination levels; o Determine the methods for the management and disposal of sediment, dredged material and dewatering water that the Proponent will be able to implement during dredging based on the results of the characterization; o Carry out, before the beginning of each maintenance dredging period, a characterization of the sediments to be dredged. The Proponent shall identify and implement methods for the management and disposal of sediment, dredged material and dewatering water, taking into account the results of the characterization, to mitigate environmental effects on the aquatic environment. <u>Measures specific to surface water management</u> • Apply erosion and sedimentation control measures during all phases of the Project in the Project work area to limit the input of contaminated and uncontaminated suspended solids to the aquatic environment during any activity associated with the Project, including excavation and management of contaminated soil. The Proponent shall: o Consider periods of flooding, heavy precipitation and frost when developing these measures; o Periodically maintain any measures implemented and repair any damaged measures in a timely manner. • Capture runoff from the Project during all phases of the Project and treat runoff that does not meet the prevention provisions of the *Fisheries Act* before releasing it into the environment during all phases of the Project; • Recover water from the basin on parcel 4 by pumping (tanker) and transferring it to the dewatering basin on parcel 3; • Promote the percolation of resurgent water into the soil during the excavation of contaminated soils; • Clean equipment and vehicles that are likely to carry contaminated soil or sediment, in a designated washing area where water is collected and treated; • For the operation of the concrete manufacturing plant: o Refer to the most recent version of the *Guide des bonnes pratiques environnementales des usines BPE* (Association béton de Québec) to determine and implement the best environmental practices; o Capture runoff from the concrete batch plant site and direct it to the Proponent's storm water system and install sediment traps in all catch basins; o Set up a watertight basin to recover the washing water from the production equipment of concrete structures for recycling in the process water; o Transfer the excess washing water to a water treatment basin by tanker truck; o Empty the sludge by dump truck and manage it off-site by a specialized firm. • During the construction phase, clean the traffic lanes, particularly on the route used by dump trucks transporting contaminated dredged sediments to the dewatering basin (continuous use of a mechanical broom). Install sediment traps in all catch basins located along this route; • Collect snow and dispose of it in an authorized location during all phases of the Project; • Install systems capable of recovering suspended solids and surface oils in each of the sumps on the new dock. <u>Specific measures for soil and groundwater management</u> • Take into account the Canadian Soil Quality Guidelines of the Canadian Council of Ministers of the Environment and the generic criteria in Appendix 2 of the Intervention Guide - Soil Protection and Rehabilitation of Contaminated Sites of the Ministère de l'Environnement et de la Lutte contre les Changements climatiques du Québec before reusing any soil excavated during the Project. The Proponent must: o Consider local ambient concentrations in the receiving environment so as not to increase contaminant concentrations in the receiving environment during any reuse of soils by the Proponent even if the quality of these soils is below the thresholds set out in the Canadian Soil Quality Guidelines by the Canadian Council of Ministers of the Environment; o No soils with contaminant concentrations above background levels within 10 metres of the high-water mark (measured on a two-year recurrence basis prior to Project implementation); o Within the framework of the Project, do not reuse any excavated soil that exceeds the Canadian Soil Quality Guidelines by the Canadian Council of Ministers of the Environment for industrial soils and the "C" criteria for industrial soils set out in Appendix 2 of the Guide d'intervention - Protection des sols et rehabilitation des terrains contaminés of the Ministère de l'Environnement et de la Lutte contre les changements climatiques and dispose of these soils in a site authorized for that purpose; o Do not reuse any excavated soil to backfill the back dock area and any other area within 10 metres of the high-water mark (measured on a 2 year recurrence basis prior to Project implementation). • Backfill the area of the back wharf or other areas near the high-water mark (recurrence of 2 years of pre-project) only with: o Dredged sediments that do not present, for any contaminant, any concentration higher than the occasional effect concentration established in the Critères pour l'évaluation de la qualité des sediments au Québec et cadres d'application : prevention, dragage, restauration (2008) of Environment and Climate Change Canada and of the Ministère de l'Environnement et de la Lutte contre les changements climatiques; o Land materials coming from outside the work area that meet the "A" criteria for industrial soils established in Appendix 2 of the Guide d'intervention - Protection des sols et réhabilitation des terrains contaminés of the Ministère de l'Environnement et de la Lutte contre les changements climatiques.

Valued Component	Mitigation Measures, Monitoring and Follow-Up
	• Do not use on the QPA's property any soil excavated as part of the upgrading work on the used snow disposal site carried out by Québec City, even if this soil meets the criteria established by the QPA for reusing soil excavated as part of the Laurentia Project; • Continuously backfill exposed soils or cover them with waterproof tarps as soon as the work is completed (daily) to limit the possibility of wind erosion or rain leaching; • Design contaminated sediment dewatering and recovery ponds to ensure sufficient capacity for the storage of contaminated sediment during the work, as well as to ensure the watertightness and stability of the structures; • Provide a watertight dumpster for trucks used to transport contaminated sediment to Parcel 3; • Cover the surface of the back wharf with asphalt or concrete and install a storm sewer system on the back wharf. <u>Specific measures during temporary work site closure</u> • Stabilize and temporarily protect the disturbed soils presenting a risk of erosion and sediment transport to the aquatic environment, using methods adapted to the site, the duration of the work site closure and the period of the year; • Ensure that the measures deployed to limit the intake of sediments from the work site to the aquatic environment function adequately and that they are maintained before the work site closure. **Monitoring and Follow-up** • Identify, as part of the development of each monitoring program, the fish species that are being monitored for each monitoring program. The Proponent shall update each follow-up program if any species monitored and identified by the Committee on the Status of Endangered Wildlife in Canada and listed under the *Species at Risk Act* change status during the implementation of each follow-up program. Monitoring of suspended solids in the aquatic environment: o Consult and implement the Recommendations for the Management of Suspended Solids (SS) during Dredging Activities (MDDELCC and ECCC, 2016) and develop, prior to construction and in consultation with Environment and Climate Change Canada and the Ministère de l'Environnement et de la Lutte contre les changements climatiques, a plan to monitor suspended solids generated by the Project. As part of the implementation of this follow-up: ▪ Establish baseline conditions for the work area in terms of turbidity and ambient levels of suspended solids prior to the start of dredging and backfilling of the backshore area that take into account the influence of tides; ▪ Calibrate the turbidity-suspended-matter curve established by the Proponent on-site, when dredging and backfilling of the backshore begins, to ensure that it is representative of conditions in the work area at the time of the work; ▪ Monitor, during dredging and backfilling of the backshore, maximum variations in suspended solids concentrations using turbidimeters positioned according to the progress of the dredging and backfilling work; ▪ Position the turbidimeters according to the progress of dredging and backfilling of the backshore in order to capture the maximum variations in suspended solids (SS) concentrations; ▪ Turbidimeters should be placed to capture the suspended solids dispersion plume at all times and to account for the reversal of current on a rising tide; ▪ Monitor, in real time using two or more additional continuously connected turbidimeter(s), the ambient levels for suspended solids outside the Project area of influence. o If the suspended solids requirement in the receiving environment is exceeded, implement additional measures to reduce negative effects; • Monitoring during hydraulic dredging to ensure continuous monitoring of sediments that are pumped into the settling basin to prevent dredging of contaminated sediments; o Gradually characterize the sediments that would be hydraulically dredged using a bucket, between 24 and 48 hours prior to dredging, for each parcel or surface unit to be dredged in order to validate that these are non-contaminated sediments. o Continuously monitor sediments pumped into the settling basin during hydraulic dredging for signs of contamination. If such contamination is discovered and in consultation with the relevant authorities, determine and implement solutions including complete removal by additional dredging or dredging and capping of the residual contaminated area. • Follow-up in relation to the exposure of sediments on the seabed following the mechanical dredging required for construction: o Monitor the quality of sediment exposed on the seabed following dredging; o Develop and implement modified or additional mitigation measures if monitoring results demonstrate that exposed sediments have a concentration for any contaminant above the casual effects concentration established in the Critères pour l'évaluation de la qualité des sediments au Québec et cadres d'application : prevention, dragage, restauration (2008) of Environment and Climate Change Canada and of the Ministère de l'Environnement et de la Lutte contre les changements climatiques. Among these measures, the Proponent can dredge the contaminated sediments or cover the residual contaminated area. • Monitoring of effluent from the uncontaminated sediment settling pond: o Perform daily monitoring of suspended solids concentrations at the settling pond weir of uncontaminated sediments; o Develops and implements mitigation measures in the event that alert thresholds are exceeded. • Monitoring of contaminated sediment dewatering pond: o Monitor water quality by sampling and characterizing the dewatering pond water, including water quality parameters related to the minimum requirements for discharge to Québec City sanitary sewer; o Conduct sampling on a daily basis, unless monitoring demonstrates that water quality meets the minimum requirements over a period of at least two weeks, in which case the Proponent shall conduct sampling on a weekly basis; o Develop and implement mitigation measures if monitoring results show any exceedance of the minimum requirements for discharge to Québec City's sanitary sewer. • Monitoring runoff water during the construction and operational phases: o Monitoring, during the construction phase, the concentration of suspended solids and petroleum hydrocarbons (C10 to C50) in the storm system outlet of Parcel 4; o Monitor, during the construction phase, the concentrations of suspended solids, petroleum hydrocarbons (C10 to C50) and pH at the end of the stormwater system in the block where the concrete plant will be located;

Valued Component	Mitigation Measures, Monitoring and Follow-Up
	○ Monitor, during the operational phase, concentrations of suspended solids, petroleum hydrocarbons (C10 to C50), metals and metalloids, polycyclic aromatic hydrocarbons and parameters representative of winter de-icing activities at the outfalls of the stormwater network in the St. Lawrence River; ○ Update, prior to operation, the monitoring program to reflect the final design of the outfalls associated with the Project; ○ Develop and implement modified or additional mitigation measures if monitoring or follow-up results show exceedances of the established criteria. • Groundwater quality monitoring: ○ During the construction and operational phases, develop and implement a groundwater quality monitoring program using the six observation wells installed upstream hydraulically from the new facilities and additional observation wells in the newly developed areas. The following parameters will be monitored at least twice a year: petroleum products (HP (C10-C50), F1-BTEX, F2-F4, PAHs and VOCs), pH, sulfide, phenolic compounds, available cyanides, PCBs, ammonia nitrogen, chlorides, total fluoride, phthalates, metals and metalloids. Integrate the results into the Proponent's annual monitoring program; ○ Develop and implement modified or additional mitigation measures if monitoring results show exceedances of established criteria. • The Proponent shall submit to the Agency, the competent authorities and the First Nations, at the end of construction, a report on the management carried out by the Proponent during construction of contaminated and non-contaminated soils and dredged sediments. The Proponent shall submit the following information: ○ A balance sheet of contaminated soils disposed of off-site (including volume, source, location of disposal, environmental quality and carrier used); ○ A balance sheet of soils moved and reused in the work area (particularly in terms of volume and environmental quality); ○ An assessment of the sediments dredged and managed in the construction site area (in particular in terms of volume and environmental quality); ○ A map(s) of the work area showing the location of soils and sediments.
Birds and bird habitat, including endangered species	**Mitigation measures** <u>General measures</u> • Put measures in place to protect birds and to avoid harming, killing or disturbing migratory birds or destroying, disturbing or taking their nests and eggs. In this regard, the Proponent shall follow Environment and Climate Change Canada's Avoidance Guidelines in order to reduce the risk to birds. The measures that the Proponent implements as part of the Project are in compliance with the Migratory Birds Convention Act, 1994, the *Migratory Birds Regulations* and the *Species at Risk Act.* • Do not carry out any activity that could interfere with the bird's nesting during their breeding period: ○ Determine the dates of the breeding period of the birds potentially present for any year during which activities that may interfere with nesting are carried out. Notify the Agency of these dates prior to undertaking these activities; • During construction and operation, maintain the nesting boxes in a condition that allows them to be used by shore martins, in particular by keeping the areas around the nesting box open (without vegetation). <u>Shorebird resting habitat offset project:</u> • The Proponent shall develop, in consultation with Environment and Climate Change Canada, and shall implement offset measures for shorebird resting habitat prior to the construction phase, that respects Environment and Climate Change Canada's Operational Framework for the Use of Conservation Allowances. According to this document, if it is not possible to implement the offset measures before adverse effects occur, the best option is to implement offset measures during the construction phase at the same time as the activities that would result in adverse effects; • Offset habitats will have to be maintained during the operational phase. Any material, installation, structure or development implemented to meet the requirements of the offset project must be maintained in the operational state specified in the offset plan; **Monitoring and Follow-up** • Identify activities or operations that may have an effect on birds, including species at risk, and for each of these, determine the measures to be put in place to ensure that the nuisance or disturbance is minimized, particularly during the nesting period. The monitoring program will have to pay particular attention to bird species at risk, including the common nighthawk and the bank swallow, which are likely to use certain areas of the Project site, particularly areas where there is no vegetation; • Update the follow-up program during construction and operation if species monitored and identified by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and listed under the *Species at Risk Act* change their status during the implementation of the Project; • Monitor the adverse environmental effects of the Project on migratory birds, including the effects of noise generated by the Project on bank swallows (Riparia riparia) and mortalities at the base of infrastructure at risk (overhead structures); • Develop and implement monitoring to determine if noise generated by construction and operations of the new terminal is having an adverse environmental effect on the species and implement corrective measures if required. <u>Tracking for shore swallows</u> • Continue to monitor the bank swallow nesting boxes to ensure the continued success of their use by the species during the construction and operational phases. Monitoring must be done over a sufficiently long period of time to ensure that the colony is maintained over the long term. Monitoring should, at a minimum, be annual during the construction phase and during the three years following construction, and every five years thereafter throughout the life of the Project's operation; <u>Monitoring of the shorebird offset project</u> • Develop, in consultation with Environment and Climate Change Canada, and implement a follow-up of the offset project for shorebirds to ensure its success and implement corrective measures if required; • Monitor the integrity and use of high tide staging habitats for shorebirds annually for a minimum of five years. The Proponent shall continue annual monitoring of staging habitats until performance indicators identified in the development of the monitoring program demonstrate the success of the staging habitats. Once the

Valued Component	Mitigation Measures, Monitoring and Follow-Up
	performance indicators demonstrate the success of the staging habitat, the Proponent shall update the monitoring program once every five years for the duration of the operation.
Other species with special status	**Mitigation measures** • Delineate in the field, before deforestation begins, the areas where deforestation would be necessary. Deforestation outside these areas should not occur unless required for safety reasons; • Carry out, before the beginning of the work, a delimitation of the environments colonized by invasive alien floristic species in order to properly identify them; • Specify in the contractors' technical specifications that the granular materials used must come from a source free of invasive alien species; • Clean machinery that will be used in areas colonized by invasive alien species before using it elsewhere on the site. Provide washing stations in areas not conducive to seed germination and away from streams, water bodies and wetlands; • If invasive alien species are visible in work areas, eliminate them by burying them on-site where excavation will take place, in a 2-metre-deep pit, then covering them with at least 1 metre of unaffected material, or by disposing of them in an authorized engineered landfill; • Revegetate disturbed areas immediately after the end of the construction work to ensure a quick recovery. Follow seeding rates prescribed by the manufacturer. Use native species to the designated Project area, including but not limited to milkweed species that support habitat the monarch butterfly (Danaus plexippus). **Monitoring and Follow-up** • In order to verify the accuracy of the environmental assessment and to ensure that the infrastructures that would be put in place would not have a significant impact on these wetlands that may be home to a special status species, the Agency considers that a follow-up of the evolution of the wetlands is necessary during the operational phase. This monitoring is discussed in more detail in Section 5.3.
Human health (physical and psychological)	**Mitigation measures** <u>Construction and operational phases</u> • Develop and implement an information and consultation plan to involve the community of potentially affected receptors, prior to any particularly noisy activity, to better understand when noise sensitivity could increase and plan the work in consideration of the findings of this consultation and implement mitigation measures if necessary; • Develop a pre-construction protocol, in consultation with potentially affected parties, for receiving complaints related to noise exposure from the Project. Implement the protocol in all phases of the Project. The protocol shall be submitted to the Agency prior to construction. The Proponent must respond to noise complaints related to any component of the Project within 48 hours of receipt of the complaint and implement corrective measures, if necessary, to reduce noise exposure in a timely manner; • Implement measures during construction and operation to mitigate exposure to noise from the Project that take into account the mitigation measures described in Appendix H of Health Canada's Guidance for Evaluating Human Health Impacts in Environmental Assessments: Noise; • Not to exceed the noise limits included in the Lignes directrices relativement aux niveaux sonores provenant d'un chantier de construction industriel and in the Note d'instruction 98-01 sur le bruit from the Ministère de l'Environnement et de la Lutte contre les changements climatiques during construction and operation, respectively; • Conduct pile driving activities and any other activity that generates tonal, impulsive or highly impulsive noise Monday through Friday during the day (7:00 A.M. to 7:00 P.M.), unless it is not technically or economically feasible. If the Proponent is to conduct any pile driving or other activity that generates tonal, impulsive or highly impulsive noise on Monday to Friday evenings or nights (7:00 P.M. to 7:00 A.M.), weekends or holidays, the Proponent shall notify the community prior to undertaking the activity; • Train workers and contractors on the importance of noise mitigation; • Equip equipment with silencers when possible; • Turn off unused electrical or mechanical equipment and trucks waiting for a load for more than the normal waiting time; • Implement physical measures such as sound barriers for noise generating equipment, low frequency equipment and impact noise; • Equip equipment (e.g., shovel and loader) with a wide band back-up alarm adjusted to obtain a maximum sound level of 10 decibels (dBA) above the surrounding noise of the work site, while respecting health and safety standards; • Develop and implement a periodic preventive maintenance plan for rail within the Proponent's property boundary, including rail grinding and lubrication, to mitigate noise from rail operations during operation. <u>Construction phase</u> • Prohibit the use of engine brakes on the job site unless safety is an issue; • Minimize slamming of the rear panels of trucks when unloading materials; • Drive the piles by vibratory driving. If pile-driving is required, use loudspeakers around the piles. These sound enclosures should reduce the sound power (Lw) generated by pile driving by at least 10 dBA; • Limit pile-driving activities to the daytime period only between 7:00 a.m. and 7:00 p.m.; • Pay particular attention to the attenuation of tonal, impulsive and very impulsive noises (such as pile driving) and avoid these types of noise at night, on weekends and holidays. <u>Operational phase</u> • Acquire gantry cranes equipped only with electric motors instead of hybrid motors (electric/diesel); • Equip new generators with reactive exhaust mufflers; • Install mechanical equipment away from sensitive receptors identified by the developer in Figures 3-1 through 3-6 of Englobe (2020n); • Locate, when possible, mechanical equipment (pumps, motors, etc.) in buildings; • Optimize the sequence of operations by reducing unnecessary equipment movements; • Turn off unused electrical or mechanical equipment and rail convoys awaiting loading whenever possible;

Valued Component	Mitigation Measures, Monitoring and Follow-Up
	• Operate the truck access gate only from Monday to Saturday (between 6:00 A.M. and 4:00 P.M.). **Monitoring and Follow-up** • Develop, prior to construction and in consultation with the relevant authorities, a follow-up program to verify the accuracy of the environmental assessment and to assess the effectiveness of the mitigation measures with respect to the noise environment. The Proponent shall submit the follow-up program to the Agency prior to the commencement of construction. This follow-up program must: o Monitor, during construction and operation, all sources of noise emissions, including impulsive and low frequency noise. The Proponent shall conduct monitoring during the day and night and during each season; o Consider the noise levels anticipated during the environmental assessment and the applicable noise limits in the Lignes directrices relativement aux niveaux sonores provenant d'un chantier de construction industriel and in the Note d'instructions 98-01 sur le bruit from the Ministère de l'Environnement et de la Lutte contre les changements climatiques during construction and operation. • Modify existing measures or develop and implement additional mitigation measures if monitoring results demonstrate that measured noise levels are higher than those predicted in the Proponent's impact statement, particularly in the event of public complaints; • Acknowledge any complaint related to noise exposure attributable to the Project as promptly as possible, or within 48 hours of receipt of the complaint, and implement, as soon as technically feasible, any corrective action under the control of the Proponent in response to any complaint received, which may include modified or additional mitigation measures or monitoring requirements.
Socio-economic conditions	**Mitigation measures** • Implement measures to support the continued recreational and tourism use of the Beauport Bay area. The Proponent shall: o During construction, develop, maintain and keep accessible a temporary storage area for recreational boats capable of accommodating at least the same number of boats as the existing storage area; o During the operational phase, develop, maintain and keep accessible a temporary storage area for recreational boats capable of accommodating at least the same number of boats as the existing storage area and protecting the boats from damage due to high winds; o During the operational phase, develop, maintain and keep accessible a boat-launch ramp and floating docks; o Mark off an access area on the beach for the launching of small craft; o Permanently relocate the watch service and, prior to relocation, implement temporary measures to meet site safety requirements during construction. • Maintain continuous, safe public access to the Beauport Bay recreation and tourism site during the construction and operational phases while improving existing access roads, notably by building an overpass over the railway tracks. • Maintain the Forum des usagers de la Baie de Beauport (FUBB) or any other equivalent group during the construction and operational phases to promote dialogue and discussion on issues related to the recreational and tourism character of the Beauport Bay site and the activities carried on there. In consultation with the FUBB, determine meeting needs and frequency. • During construction, define and maintain a safety perimeter around the aquatic and terrestrial work sites in consultation with potentially affected parties. • Prior to construction, update the navigational rules to be followed by recreational boaters and commercial ships docking at the Port of Québec and the Ross-Gaudreault Cruise Terminal during construction and operation to reflect the Project. • In consultation with the potentially affected parties and the First Nations consulted for the Project, develop a communication plan to disseminate information such as the following: o the location and size of permanent and temporary works related to any dredging required for the Project, including aquatic and terrestrial disposal sites, and the type, volume and level of contamination of sediments to be dredged; o during construction, the anticipated start and end dates (month and year) and schedules of activities associated with the installation of the retaining dike, backfilling of the back-wharf and the installation of the visual and acoustic screen, and any other activities associated with the Project that requires temporary access restrictions, particularly for the Beauport Bay recreational and tourism area; o during the operational phase, the ship arrival, departure and mooring schedule and the ship loading and unloading schedule, including the posting of schedules near the boat-launch ramp; o any navigation restrictions, measures or aids; o the quality of swimming water in Beauport Bay; o any other information relevant to Beauport Bay users and boaters, the First Nations concerned and any other party involved in or affected by the Project. • During the operational phase, mark off and maintain an area in which recreational and tourism activities are prohibited during ship loading and/or unloading to ensure the safety of Beauport Bay users and the activities taking place there. • During the construction and operational phases, consult with potentially affected parties and provide navigational aids to mitigate the adverse environmental effects that the Project has on recreational boating, including: o installing and maintaining anemometers to continuously measure wind speeds at sites associated with boating from Beauport Bay and disseminating the information to boaters; o installing and maintaining beacons to mark rocks in the southwestern re-entrant; o developing and maintaining a map of the Beauport Bay boating area to inform boaters of boating conditions. • In consultation with the Fédération québécoise des chasseurs et des pêcheurs (FédéCP), establish zones under the Proponent's jurisdiction that will serve to improve the quality and quantity of fishing areas in the Port of Québec sector. • Revise the predictive swimming water quality model and provide all relevant information to Québec City for monitoring the quality of swimming water.

Valued Component	Mitigation Measures, Monitoring and Follow-Up
	Monitoring and Follow-up • Prior to construction, the Proponent shall develop, in consultation with potentially affected parties, a follow-up program to verify the accuracy of the environmental assessment and to determine the effectiveness of the measures taken to mitigate the Project's impact on light sailing, windsurfing and kitesurfing in the boating area marked on Englobe's Map 17-2 (2020p). The follow-up program shall include the following: o determining and describing the Project's actual effects on the wind regime (including wind speed wind taking into account their direction and turbulence conditions); o determining and describing changes due to the presence of the new container terminal (including encroachment on the site by the Project and changes in the wind regime) in the use of the boating area and the terrestrial area for light sailing, windsurfing and kitesurfing; o carrying out a follow-up in Years 1, 3 and 5 of operation and make the reports available to potentially affected parties; o in consultation with potentially affected parties, proposing adaptive measures such as mitigation or offsetting measures to reduce impacts. • To verify the accuracy of the environmental assessment concerning the evolution of beach erosion and the displacement of the sand spit in the southwestern re-entrant, the Agency is of the opinion that the morpho-sedimentological follow-up specified in Section 5.3 will provide follow-up. o Following analysis of the results, in consultation with Environment and Climate Change Canada, the Ministère de l'Environnement et de la Lutte contre les changements climatiques, and the managers and users of the recreation and tourism site, determine the actions required to maintain the beach while ensuring that the surrounding biological environments – specifically, the wetlands of the southwestern re-entrant – are not damaged. • Follow-up programs appropriate to the socio-economic context have been identified for other valued components analyzed in this report. In particular, see the sections on fish (5.4) and human health (5.7).
Indigenous peoples - Current Use of Lands and Resources for Traditional Purposes	**Mitigation measures** • Transmit the construction work schedule to representatives of various First Nations to inform users who practice traditional activities near the Project site; • Have regular follow-ups with First Nations who wish to do so regarding the design, implementation and evolution of the environmental follow-up program for damages caused to fish and fish habitat. These meetings would be adapted and planned according to the interests and concerns of the interested First Nations in order to exchange and discuss the potential effects that could be linked to the Project; • Facilitate access for First Nations members to the territory under the jurisdiction of the Québec Port Authority; • Implement the fish and fish habitat mitigation measures identified in Subsection 5.4.2 to limit effects on fish and fish habitat; • Implement the mitigation measures for accidents and malfunctions under the responsibility of the Proponent presented in Section 6.1 to avoid adverse effects on resources. **Monitoring and Follow-up** • The Proponent shall develop, prior to construction and in consultation with First Nations and competent authorities, a follow-up program to verify the accuracy of the environmental assessment and to judge the effectiveness of the mitigation measures with respect to the adverse environmental effects on: o Indigenous fisheries of the following fish species: striped bass, lake sturgeon, Atlantic sturgeon and American shad; o Migratory bird hunting that takes place within the Québec Port Authority's area of jurisdiction.
Physical and cultural heritage	**Mitigation measures** • Use materials and colours for structures, such as cranes, that harmonize with the landscape; • Design, prior to construction and in consultation with potentially affected parties, a visual screen and native plant species to the area to reduce the visual appearance of container storage; • Revegetate landscaped slopes and bare areas as construction is completed. Use native species for this purpose; • Develop and implement, in consultation with Parks Canada Agency and the First Nations, a procedure for dealing with chance finds made during the terrestrial construction phase. Under the chance-find procedure, the Proponent shall: • Immediately halt work at the location of the discovery; • Delineate an area of at least 30 metres around the discovery as a no-work zone; • Assign a qualified person who is an archaeologist to carry out an assessment at the location of the discovery; and • Consult Parks Canada Agency for advice and guidance. • Fully implement the Archaeological Response Plan filed as an appendix to the CEA Agency's Response Document to the Second Request for Additional Information of August 2019 - Physical, Cultural and Archaeological Heritage (Englobe, 2020w) in accordance with the standards and principles of underwater archaeology and with the recommendations or supervision of a marine archaeologist. These include, but are not limited to: o carry out additional studies and provide the results and recommendations to the Agency before work begins (point 5.2 of the intervention plan). o Put measures in place to ensure the conservation of archaeological sources in the case of chance discoveries (point 5.3 of the intervention plan). o For anomalies with high archaeological potential that could not be verified prior to dredging activities, carry out monitoring during dredging under the supervision of a marine archaeologist. o Present to the Agency, Parks Canada and First Nations who have expressed the wish to do so, as indicated in the document in Englobe (2020w), the results of the work planned in the archaeological plan and the annual review of the results of the archaeological monitoring. **Monitoring and Follow-up** • Develop and implement a follow-up program to validate the accuracy of the environmental assessment and judge the effectiveness of mitigation measures on the visual environment. The Proponent will have to compare photographs taken from points of view comparable to those used in the visual simulations carried out as part of the impact statement. Photographs must be taken every two years for the first 10 years following the end of construction and every 5 years thereafter, until 25 years following the end of construction. Corrections will be

Valued Component	Mitigation Measures, Monitoring and Follow-Up
	made as required if mitigation measures need to be modified or added to reduce the effects on the visual environment. • The monitoring should make it possible to concretely evaluate the effect felt by residents and vacationers, for example by means of a survey that will be carried out after the Project is up and running. • Monitor the growth, composition and abundance of vegetation and make the necessary corrections in case of plant degradation, including replacement of plants. • Develop a pre-construction feedback protocol for effects on the visual environment. The Proponent will be required to implement the protocol during construction and operation.
Accidents or Malfunctions	**Mitigation measures** <u>General measures</u> • Take all reasonable steps to prevent accidents and malfunctions that may cause adverse environmental effects; • Consult, prior to construction, the Huron-Wendat, Wabanaki, Innu, Mohawk and Maliseet First Nations and the competent authorities on the measures to be implemented to prevent accidents and malfunctions; • Update, before construction and in consultation with the Huron-Wendat, Abenaki, Innu, Mohawk and Malecite First Nations, as well as the relevant authorities, an accident or malfunction response plan for each phase of the Project. The accident and malfunction response plan shall: o Include mapping of the sensitive elements of the environment (in terrestrial and river environments) to guide the responses in case of accident or malfunction. A periodic update of the mapping must be provided to account for any change to the environment and the status of the species. o Specify the types of accidents and malfunctions that risk causing adverse environmental effects. o Account for the results of the risk assessment associated with the handling and storage of dangerous goods in Classes 2.1 (flammable gases), 2.3 (toxic gases) and 3 (flammable liquids) and determine the safe handling and storage procedures and the control measures to account for sensitive receptors. o Provide for an alert system for the users of the Baie de Beauport recreational tourism zone and plan the lockdown measures or evacuation scenarios in case of incidents involving dangerous goods at the terminal facilities, to ensure maintenance of safe access to the recreational tourism zone. The emergency measures must account for the special peninsular features of Baie de Beauport. o Determine the necessary equipment to respond to emergencies and localize it to ensure its availability. o Provide for training of personnel on maintenance and use of the response equipment. o Describe what is planned in case of a spill of hazardous materials to protect the sensitive elements of the environment, including surface water, groundwater and wetlands, fish, migratory birds and other sensitive species. o Provide for an emergency planning zone with a radius of 6.8 km to cover all daytime and nighttime scenarios. o Implement the appropriate measures described in the emergency response plan in the event of an accident or malfunction that could result in adverse environmental effects: ▪ Implement the communications plan in relation to accidents and malfunctions; o Notify the Huron-Wendat, Wabanaki, Innu, Mohawk and Maliseet First Nations as soon as possible, as well as the potentially affected parties and the competent authorities of the accident or malfunction and notify the Agency in writing no later than 24 hours following the accident or malfunction. For the notice to First Nations and the Agency, the Proponent shall specify: ▪ The date on which the accident or malfunction occurred; ▪ A description of the accident or malfunction; ▪ A list of any substances potentially released to the environment as a result of the accident or malfunction. o Notify appropriate authorities with responsibilities related to emergency response, including environmental emergencies, in accordance with applicable regulatory and legislative requirements. • Submit a written report to the Agency no later than 30 days after the accident or malfunction. The written report shall include: o A description of the accident or malfunction and its adverse environmental effects; o The measures that have been taken by the Proponent to mitigate the adverse environmental effects caused by the accident or malfunction; o All views of First Nations and advice from the competent authorities received with respect to the accident or malfunction, its adverse environmental effects and the measures taken by the Proponent to mitigate those adverse environmental effects; o A description of any residual adverse environmental effects and any additional or modified measures required to be taken by the Proponent to mitigate the residual adverse environmental effects; o Details regarding the implementation of the emergency response plan in the event of an accident or malfunction. • Submit, no later than 90 days after the accident or malfunction, and taking into account the information previously submitted, a written report to the Agency on the changes made to prevent the recurrence of such an accident or malfunction and on the implementation of any modified or additional measures to mitigate and monitor the residual adverse environmental effects and to undertake any required progressive claims. The report includes the views of the Huron-Wendat, Wabanaki, Innu, Mohawk and Maliseet First Nations and potentially affected parties, as well as the views of additional competent authorities received by the Proponent. • Develop, prior to construction, a communications plan in consultation with the Huron-Wendat, Wabanaki, Innu, Mohawk and Maliseet First Nations and potentially affected parties. Implement and maintain the communications plan during all phases of the Project. The communications plan includes in particular: o The types of accidents and malfunctions requiring the Proponent to notify each First Nation and potentially affected parties. The manner in which each First Nation and potentially affected party shall be notified by the Proponent of an accident or malfunction and the opportunities for First Nations and potentially affected parties to assist as a result of the accident or malfunction; o The contact information of the Proponent's representatives with whom First Nations and potentially affected parties may communicate and the contact information of the representatives of each of the First Nations and potentially affected parties that the Proponent notifies. <u>Measures specific to rail transport</u> • Establish a speed limit for trains at no more than 25 kilometres per hour within the administrative limits of the Québec Port Authority and require that any person respect this speed limit.

Valued Component	Mitigation Measures, Monitoring and Follow-Up
	Measures specific to maritime transport • Establish, in consultation with the Laurentian Pilotage Authority, an approach and berthing manoeuvring zone so that any vessel associated with the Project may approach the wharf at reduced speed, subject to navigational safety; • Indicate, before dredging, the beginning of the dredged area with buoy K168 and keep the buoy in place during all dredging; • Maintain, during construction and operation, equipment for responding to accidental spills of contaminants in the area of the construction site, including a rapidly deployable floating phase collection device; • Maintain a fire protection system during construction and operation that meets the technical requirements and operational risks of the Project and is designed by an engineer licensed in Quebec; • Determine, in consultation with the Laurentian Pilotage Authority, a maximum wind speed for berths and departures that takes into account the sails of vessels associated with the Project, subject to the safety of navigation, and establish a corresponding maximum wind speed at which loading and unloading activities of containers associated with the Project stop. Measures specific to container management • Designate the dangerous goods container storage area associated with the Project to allow for the segregation of this area and taking into account the risks associated with existing port operations in the Project area, including the operation of International-Matex Tank Terminals facilities; • Conduct a visual inspection of containers to verify their condition during handling and loading operations onto trains or trucks and ensure that they comply with safe shipping practices for rail and road transportation; • Make an inventory, for each dangerous containerized cargo, of the containerized dangerous goods that are stored and transshipped, indicating the maximum quantity authorized to be stored on the premises and the class of dangerous goods according to the International Maritime Dangerous Goods Code.
Cumulative Environmental Effects	**Mitigation Measures** Fish and fish habitat, including invertebrates The Agency considers that the following additional mitigation measure would reduce cumulative effects on mussels: • Inspect dredges and other watercraft used in the aquatic environment prior to their arrival at the work site to ensure that they are free of invasive alien species. However, as with the Project's direct effects on fish and fish habitat, the Agency considers that the key measures identified in Section 5.4 would not sufficiently mitigate the Project's potential effects to ensure that the cumulative effects are not significant. Current Uses of Lands and Resources for Traditional Purposes Based on the analysis of the effects on fish and fish habitat (Section 5.4), the Agency considers that no mitigation, monitoring or follow-up measures would sufficiently reduce the cumulative effects of the Project on the practice of fishing and the activities and customs surrounding this practice to ensure that the cumulative effects are not significant. Socio-economic conditions Based on the analysis conducted on fish and fish habitat (Section 5.4) as well as socio-economic conditions (Section 5.8), the Agency considers that no mitigation, monitoring or follow-up measures would sufficiently reduce the Project's cumulative effects on recreational and commercial fishing to ensure that they are not significant. Air Quality Since air quality in the airshed area is already affected by a variety of industries and activities, any mitigation measures related to cumulative effects should be developed in consultation with other users of the environment. For this reason, the Agency considers that, in addition to the measures already planned and in place at the Port of Québec and those identified in Section 5.1, the following measures are necessary to help mitigate potential cumulative environmental effects on air quality: • Pursue efforts to improve air quality with local stakeholders through the *Comité intersectoriel sur la contamination environnementale dans l'arrondissement de La Cité-Limoilou* (CICEL) (or any other committee aimed at improving air quality in the borough of La Cité-Limoilou), of which the Québec Port Authority is a member (established in 2013, the CIECEL brings together several players from the industrial sector, as well as representatives of Québec City, the Ministère de l'Environnement et de la Lutte contre les changements climatiques and citizens); • Develop a plan to manage atmospheric emissions from all Port of Québec activities, including those generated by the Project; • Continue to develop initiatives to improve the Proponent's activities to reduce its air quality footprint. Human Health Since human health in the borough of La Cité-Limoilou is already affected by social and health inequalities, the Agency considers that no mitigation or follow-up measures can sufficiently mitigate cumulative effects to make sure that they do not become significant. However, the Agency considers that the measures provided for in Sections 5.1 and 5.7 and Subsection 6.3.5 can reduce cumulative effects on human health to some extent.

Appendix D: Summary of First Nations Concerns

This appendix includes the comments received from First Nations as part of the environmental assessment and the consultation on the draft Environmental Assessment Report, as well as the responses provided by the Québec Port Authority (the Proponent) and the Agency. The concerns presented have been synthesized by the Agency from the issues raised during the various meetings with First Nations and comments submitted during the environmental assessment process. The First Nations' comments are available on the Canadian Impact Assessment Registry. The comments are presented in order of chapters of the Environmental Assessment Report.

Table 23: Summary of First Nations concerns

Theme	Summary of the comment or concern	Summary of the Proponent's response	Agency's Response
Huron-Wendat Nation (NHW)			
Air quality	NWH is concerned about air quality since many Huron-Wendat are involved in activities, live or work near the Project site.	The Proponent considers that the optimizations made to the Project during the environmental analysis (semi-automated terminal, rail transport preferred to trucking, electric and hybrid equipment and electric power supply system for ships) as well as the good practices and measures it already applies within the framework of its current operations would be sufficient to limit the Project's effects on air quality. These mitigation and monitoring measures are described in Subsection 5.1.2.	Concern included in Chapter 5 of the Final Report (5.1.3). The Agency concludes that the additional contribution of the Project in an area where air quality is already significantly impacted, particularly with respect to total particulate matter, fine particulate matter, nitrogen dioxide, and nickel is likely to result in significant deterioration of air quality in surrounding residential neighborhoods and public places. The Agency includes several conditions on the Project related to air quality (Appendix C and Section 5.1) to limit the effects of the Project on air quality and human health.
	NWH notes that many of the measures proposed by the Proponent are reactive, not precautionary.	Not applicable.	Concern included in Chapter 5 of the Final Report (5.1.2.). The Agency includes several conditions on the Project related to air quality (Appendix C and Section 5.1) to limit the effects of the Project on air quality and human health.
Terrestrial and wetlands environments	NHW has requested a offset plan for the loss of wetlands and the protection or restoration of 7 hectares of destroyed terrestrial areas.	The Proponent is proposing a project outside the Laurentia Project for the development of a *Trame verte* (green grid) on the periphery of the port sector. This project, would make it possible to offset the 3.2 hectares of terrestrial vegetation that will be lost due to the Project, is underway. The Proponent does not foresee any permanent loss of wetlands. The Proponent proposes a monitoring of the evolution of the surface area of wetlands.	The Agency is of the opinion that the Project is unlikely to cause significant residual adverse environmental effects on wetlands and their ecological and socio-economic functions since the Proponent would avoid all wetlands. The Agency has identified key mitigation measures and the follow-up program to avoid effects on wetlands in Section 5.3. In particular, a program to monitor the evolution of the wetlands will have to be set up in order to verify the accuracy of the conclusions of the environmental assessment.
Fish and fish habitat	The First Nation shared several concerns about the potential effects of the Project on striped bass. The NHW has made proposals for mitigation measures related to the striped bass (e.g., work restriction period).	According to the Proponent, the Project would affect striped bass rearing habitats in the St. Charles River estuary and Baie de Beauport, as well as striped bass spawners whose spawning area includes the footprint of the wharf and the back wharf and the dredging area. The Proponent undertakes to apply a restriction period during dredging work.	The Agency is of the opinion that the Project would result in significant residual adverse environmental effects on fish and fish habitat, and special status species due to the destruction and permanent alteration of habitat. The Agency has identified the key mitigation measures and follow-up program for fish and fish habitat in Section 5.4, including carrying out the in-water works outside of sensitive periods for fish.
	The NHW wonders about the effects of the Project on the American shad and Atlantic salmon.	According to the Proponent, the majority of migrating shads in the Project area would use the south channel of Île d'Orléans. The estuary of the St. Charles River would be unfavourable in terms of habitat for the species. He does not anticipate any effect of the Project on shads or Atlantic salmon.	The Agency is satisfied with the Proponent's responses and, based on Fisheries and Oceans Canada's advice, does not anticipate any effect of the Project on these species.
	Requests that all species of fish with special status be subject to an offset plan (including American shad).	The Proponent submitted an offset program to offset the effects of the destruction and modification of fish habitats, which is intended to provide similar or higher quality feeding habitats for species it considers affected by the Project.	The Agency is of the opinion that the Project would result in significant residual adverse environmental effects on fish and fish habitat, and special status species due to the destruction and permanent alteration of habitat. The Agency relies on the advice of Fisheries and Oceans Canada that offset lost spawning habitat would not be possible given the nature and complexity of the features that are attractive to striped bass. The adverse effects of the Project could not be mitigated, avoided or controlled by measures consistent with the recovery plan for the species. The Agency has identified the main measures likely to mitigate several potential effects of the Project in Section 5.4. However, these measures taken together would not sufficiently mitigate the potential effects of the Project to render the residual effects insignificant.

	NHW believes that the following actions found in Subsection 5.5.3 should have also been found in Subsection 5.4.3: “Follow up on status updates for bird species monitored and identified by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and listed under the *Species at Risk Act*; Implement additional measures to mitigate the effects of the Project on affected species in the event that the status of a species changes during the implementation of the monitoring program”.	Not applicable, comment for the Agency.	The Agency has not made any changes to the “Other Special Status Species” section as analyses have shown that the Project site is unlikely to support such species. The *Species at Risk Act* requires managers of federal lands to ensure that they do not harm species at risk.
Birds and bird habitat	NHW questions the fact that the Proponent’s involvement in terrestrial habitat protection projects in the vicinity of the Project site was not included in the key mitigation measures.	Not applicable.	The Agency considers that the work site is highly industrialized and contains little valuable habitat. A colony of bank swallows is located in the embankments on the waterfront. The Proponent installed a nesting box to offset the loss of habitat. The use of the nesting box by the birds will be monitored to ensure its sustainability. With respect to the shorebird offset project, the Proponent will be required to develop an offset project and submit it to the appropriate authorities. ECCC is of the opinion that an offset project can be developed to offset the losses.
Special status species	Concerns regarding monitoring and the implementation of mitigation and offsetting measures for species at risk such as the Chimney Swift or the Common Nighthawk.	The Proponent does not anticipate any effect on special status species of birds. It proposes a monitoring program for these species, including monitoring of the artificial nesting box for shore swallows.	The monitoring of birds and bird habitat, including special status species, proposed by the Proponent is included in the Agency's monitoring requirements in Section 5.5.
Socio-economic conditions	The NHW wishes to be a partner in the Project and the continuation of the work of the Working Table set up with the Proponent.	The Proponent has committed to continue the work of the Permanent Working Table with NHW.	The Agency forwarded the comment to the Proponent and considers that the continuation of the Permanent Table would promote collaboration between the Proponent and the First Nation (Section 5.9).
	NHW is concerned about the impacts that this Project could have on the exercise of its right to trade, for example by restricting access to the territory, or by having an impact on the quality and abundance of resources available in the St. Lawrence River.	Not applicable, comment for the Agency.	The Agency has incorporated this concern into its analysis in Section 5.8 (socio-economic conditions) and Chapter 7 (Aboriginal and treaty rights).
Common Uses for Traditional Purposes	Shared concerns regarding the American Shad fishery at the Pointe à Puiseaux site and under the Quebec Bridge.	According to the Proponent, the construction and operation activities of the Laurentia Project do not threaten the integrity of these sites, since they are located outside the construction zone. One of the options in the Proponent’s offset plan aims to improve the crossing of obstacles to the free movement of American shad in four watersheds in the Québec City area.	These sites are located outside the expanded study area. The Agency is satisfied with the responses provided by the Proponent regarding the link between its offset plan and the species fished by Indigenous people. Information concerning American shad can be found in Section 5.4.
	The NHW shared information regarding the use of Beauport Bay and nearby areas for fishing and migratory bird hunting and concerns regarding members' access to the territory and resources.	The Proponent has integrated in its analysis the results of the complementary study conducted by NHW concerning the use by its members of the Project study area. It indicates that construction activities could disrupt access to fishing and hunting practice sites, but that these access would not be modified during the operational phase. The Project would encroach on only a small portion of one of the fishing sites used by NHW.	The Agency is of the opinion that the Proponent has provided an analysis and drawn adequate conclusions regarding the effects of the presence of the construction site and the operation of the terminal on access to territories and resources for the practice of hunting and fishing activities near the Project site. The Agency considers that the implementation of follow-up meetings and the continuation of meetings within the framework of the Permanent Table for the Huron-Wendat Nation would allow the Proponent and the NHW to discuss the progress of the Project and their concerns in a spirit of cooperation. On the other hand, the Agency is of the opinion that the Project could have consequences on the practice of fishing in the St. Lawrence River and its estuary and the resulting uses for First Nations in relation to the loss and modification of habitats caused by the encroachment of the Project and by dredging on migratory species such as striped bass, lake sturgeon, Atlantic sturgeon and American shad.

	The various Huron-Wendat practice sites presented by the Agency in the section on uses constitute a portrait frozen in time. Research shows that the territorial activities of the Huron-Wendat fluctuate in time and space.	Not applicable, comment for the Agency.	The Agency has added this nuance to the chapter on current uses to take into account the fluctuation of activities practiced by the Huron-Wendat and more generally by First Nations in general.
Cultural Heritage	NHW wishes to participate in the evaluation of the archaeological heritage	In addition to the archaeological potential study, an underwater geophysical survey and a sediment profiler survey were carried out in the construction area by the Proponent. The Proponent proposed an archaeological intervention plan that it would implement prior to the start of work and continue throughout all phases of the Project.	The Agency has identified the main mitigation measures likely to reduce the potential effects on cultural heritage in Section 5.10, including the presentation to First Nations who have expressed the wish to do so, of the results of the work planned in the archaeological plan and the annual report on the results of the archaeological monitoring.
Aboriginal and Treaty Rights	The NHW recalls the rights exercised by the Nation over Nionwentsïo and confirmed by the Treaty of 1760.	This information is included in the Proponent's documents.	The Agency has taken these comments into account in preparing its report and the rights impact assessment presented in Chapter 7.
	Requests for modifications to the reference condition presented by the Proponent in relation to the occupation of the territory and the southwestern part of the Innu First Nations.	The Proponent has made certain adjustments in its reference state and integrated the NHW's comments in relation to the Innu territorial assertions.	In Chapter 7, the Agency indicated the possible overlaps between First Nations' territorial assertions. The Agency has indicated to NHW that this issue, however, goes beyond the scope of environmental assessment.
Grand Council of the Waban-Aki Nation (GCNWA)			
Project justification	The GCNWA, like some members of the public, questions the need for extensive filling in the river to carry out the Project, which is not consistent with the conservation and protection of species of special concern, including the striped bass population of the St. Lawrence River.	Not applicable, comment for the Agency.	Comment added by the Agency in the final EA report.
Fish and fish habitat	Concerns about the effects of the Project on migratory fish species moving to Wabanakiak practice sites: lake sturgeon, Atlantic sturgeon, striped bass. The GCNWA also indicated that it would like to be kept informed of expert advice on these species and any related information.	According to the Proponent's analysis, the potential effects during the operational phase on special status fish species would affect juvenile and adult striped bass, juvenile Atlantic sturgeon and adult and juvenile lake sturgeon, which mainly use the St. Charles River estuary as feeding habitat. The Proponent undertakes to keep Wabanaki representatives consulted and informed about the proposed offset plan to offset the effects of the destruction and alteration of fish habitat, which aims to provide similar or higher quality feeding habitat for the affected species.	The Agency is of the opinion that the Project would result in significant residual adverse environmental effects on fish and fish habitat, and special status species due to the destruction and permanent alteration of habitat. The Project would cause significant habitat loss and negatively affect several species, including striped bass, lake sturgeon, Atlantic sturgeon and American shad. In particular, Fisheries and Oceans Canada considers that the losses of fish habitat that would result from the Project have not been sufficiently avoided, mitigated and offset and that the Project would result in negative effects on fish and fish habitat. The Agency has identified measures that could mitigate several potential effects of the Project in Section 5.4. However, these measures taken together would not sufficiently mitigate the potential effects of the Project to render the residual effects insignificant. The Agency forwarded DFO's final advice regarding the effects of the Project on fish and fish habitat, including effects on migratory species, to the First Nation. A meeting was also organized by the Agency between DFO and GCNWA representatives regarding this advice.
	Concerns about the impact of impacts on migratory fish species on community fisheries, lived experience and intergenerational transmission.	According to the Proponent, the fish habitat modifications related to the Laurentia Project will not have a significant negative effect on the W8banaki Nation's fisheries, neither during the construction phase nor during the operational phase. The Proponent is of the opinion that the Project will not have a significant negative effect on the experience of the territory, on the governance capacity of W8banakiak on fisheries resources and on the intergenerational transmission of their knowledge. This opinion is based primarily on the Proponent's arguments that the Project will not have a significant adverse effect on fish habitat.	Sections 5.9 and 7 on current traditional uses and rights incorporate an analysis of the effects of the Project on these components (Impact pathways - Resource - Access - Experience). The Agency is of the opinion that the Project would result in significant residual adverse environmental effects on the current use of lands and resources for traditional purposes and, in particular, on the fishing activities practised by the W8banaki Nation due to the effects of the Project on fish and fish habitat. According to the Agency, the effects of the Project on migratory fish species fished by W8banakiak could have repercussions on cultural practices, such as the transmission of knowledge, surrounding fishing.

	Importance of consulting W8banakiak on the offset plan to ensure that the measures put in place will be sufficient for the Nation's members.	The Proponent has committed to keeping the Nation up to date on its proposed offset plan.	As part of the consultation on this report, discussions will continue with the W8banaki Nation regarding offsetting measures related to the impacted uses and rights. Considering that no offset project would be able to offset the loss of fish habitat, the Agency considers that the mitigation measures related to fish and fish habitat would not sufficiently mitigate the potential effects of the Project to render the residual effects, including those on traditional uses and rights, insignificant.
Maritime transport	Concern regarding the Project's impact on the increase in maritime traffic in the Lake Saint-Pierre sector and more generally on the cumulative effects of maritime transport: erosion caused by wave action, effects on uses, erosion and disappearance of important sites, access to the river, invasive alien species.	The Proponent states that no increase in marine traffic is expected between Québec City and Montréal and that the assessment of the cumulative effects of marine transportation is outside the scope of the environmental assessment of the Project. The Proponent indicates that the risk of contamination of the mule mussel (freshwater mussel) population by ships' ballast water will be accentuated by the modification of ships' transit and by the greater capacity of these ships involving larger ballast volumes. For the construction phase, the Proponent proposes to inspect dredges and other watercraft used in the aquatic environment before they arrive on the construction site to ensure that they are free of invasive alien species.	The Agency shared information regarding the anticipated increase in marine traffic to the First Nation. Although the increase in marine traffic outside the Project study area is outside the scope of the environmental assessment, the Agency has incorporated the MCK's concerns into Chapter 7 on Aboriginal and Treaty Rights. The Agency has detailed the main measures likely to reduce the risk of accidents and malfunctions in Section 6.1.The Agency is satisfied with the information provided by the Proponent confirming that the vessels targeted by the Laurentia Project would not be able to travel to Montréal due to insufficient water depth and that no increase in traffic generated by the Project is expected between Québec City and Montréal. Consequently, no effect related to the maritime transport generated by the Project is expected on the access and experience in the territory by W8banakiak. The Agency has identified measures proposed by the Proponent that could mitigate the effects of invasive species on mules in Section 5.4.
	Cumulative effects concerns are not just about the cumulative effects of marine transportation, they are more global.	Not applicable, comment for the Agency.	This nuance is included in the report, particularly in Chapter 3, which summarizes the concerns of First Nations.
Cumulative effects	Concerns about the cumulative effects of the Project and the various port projects on the ecosystems and the uses and rights of W8banakiak. The Grand Council of the Waban-Aki Nation and the Council of the Huron-Wendat Nation supported the request for a regional assessment submitted by the Mohawk Council of Kahnawà:ke to the Minister of Environment and Climate Change in July 2020.	The Proponent mentions that the increase in navigation on the St. Lawrence River due to the various port expansion projects underway or under evaluation could have consequences on fishing practices and on the experience of First Nations. It could also imply a loss of peaceful enjoyment of the territory for users of the water body and induce a perception of increased disturbance of the territory.	The Nation's concerns have been incorporated into Chapter 7 on Rights Impact Assessment. Cumulative effects are among the criteria used to assess the extent of the Project's impacts on rights. According to the Agency, in relation to cumulative effects on fishing rights, the impacts on rights would be of high severity. Section 6.3 presents an assessment of the cumulative effects of the Project on current traditional uses. The GCNWA supported the request for a regional assessment on the St. Lawrence River submitted to the Minister of Environment and Climate Change by the Mohawk Council of Kahnawà:ke. The Agency conducted an engagement process with federal and provincial authorities, other interested First Nations and non-governmental organizations. The results of this process will be shared with the Minister, so that he can make a final decision on the conduct of a regional assessment.
Current Use of Lands and Resources	Reference to “lake sturgeon” as an iconic and important species to be modified as all sturgeon species are important to the Nation.	Not applicable, comment for the Agency.	Amendment made to the Final report.
Consultation and Rights Impact Assessment	Late integration of the rights impact assessment methodology: the application of the proposed methodology requires that information needs be planned in collaboration with the communities concerned before the impact assessment guidelines are published.	Not applicable	The Agency presented the new fee impact assessment methodology to the GCNWA in March and October 2019. The Agency has incorporated GCNWA's reservations regarding the use of the methodology in Chapter 7 of this report.
Impacts on Aboriginal and Treaty Rights	The initiatives and efforts invested by the W8banakiak in the protection and monitoring of fish (striped bass, sturgeon) may be negated by the impacts of the Project, which has an impact on the governance and self-determination of the Nation.	Not applicable, comment for the Agency.	This concern was added in the section on rights (Chapter 7) of the Final report and considered in the Agency’s analysis.

Wolastoqiyik (Maliseet) Wahsipekuk First Nation (WWFN)			
Maritime transport	Concerns about the impacts of an increase in maritime traffic on the St. Lawrence River and particularly on the beluga whale nursery located in Cacouna.	According to the Proponent, the increase would be 3 boats per week, or about 156 more boats per year. Beluga whales are not included in the environmental assessment of the Project because they are not found in the study area.	Information regarding the expected increase in marine traffic was shared with the First Nation. Although the increase in vessels traffic outside of the Project study area is outside the scope of the environmental assessment, the Agency has incorporated WWFN's concerns into Chapter 7 on Aboriginal and Treaty Rights.
Cumulative effects	Concern about the cumulative effects of the various port projects, especially on fishing	The Proponent mentions that the increase in navigation on the St. Lawrence River due to the various port expansion projects underway or under evaluation could have consequences on fishing practices and on the experience of First Nations. It could also imply a loss of peaceful enjoyment of the territory for users of the water body and induce a perception of increased disturbance of the territory.	The Nation's concerns have been incorporated into Chapter 7 on Rights Impact Assessment. Cumulative effects are among the criteria used to assess the extent of the Project's impacts on rights. According to the Agency, in relation to cumulative effects on fishing rights, the impacts on rights would be of high severity. Section 6.3 presents an assessment of the cumulative effects of the Project on current uses for purposes.
Essipit Innu First Nation (EIFN)			
Fish and fish habitat	The First Nation would have liked the Proponent to talk about potential negative effects on all fish species, not just migratory species. Resources harvested by the Innu: cod, redfish, capelin, American pout, sea trout, smelt and herring.	The Proponent provided information confirming that the fish species cited by the First Nation do not frequent the Project area, with the exception of smelt. The Project would affect rearing areas particularly used by American smelt. The Proponent is proposing a offset plan to offset the effects of the destruction and modification of fish habitats, which aims to develop feeding habitats of similar or higher quality for the affected species.	The Agency is satisfied with the Proponent's responses, which specify that apart from smelt, none of the other fish species cited by the First Nation are found in the Project area. The Agency relies on the advice of Fisheries and Oceans Canada, which considers some of the Proponent's offset proposals to be relevant to offset losses to certain habitats and valued species, such as yellow walleye or American smelt.
Special status species	Questioning on the authorization of the Project and the *Species at Risk Act* (striped bass).	Not applicable	The Agency provided preliminary and final advice from DFO on the effects of the Project on fish and fish habitat. In its final opinion, DFO indicated that under the current state of affairs and the current status of striped bass, the Project would not be authorized under the *Species at Risk Act*.
Maritime transport	Concerns related to the increase in marine traffic and the risk of accidents and the effects on traditional practices, rights, beluga whales, species of interest and the related economy, user safety and invasive alien species.	According to the Proponent, the increase would be 3 boats per week, or about 156 more boats per year. Beluga whales are not included in the environmental assessment of the Project because they are not found in the study area. The Proponent shared information with the First Nation regarding marine safety regulations. The Proponent used the TERMPOL review to analyze the risks associated with marine transportation.	The Agency shared information regarding the anticipated increase in marine traffic to the First Nation. Although the increase in marine traffic outside the Project study area is outside the scope of the environmental assessment, the Agency has integrated the concerns of the Innu First Nations in Chapter 7 on Aboriginal and treaty rights. The Agency has identified the main measures that could reduce the risk of accidents and malfunctions in Section 6.1.
Cumulative effects	Request that Federal Government conduct a regional assessment to assess the cumulative effects of navigation on a regional scale. Questioning the Agency's ability to assess cumulative effects in a comprehensive manner	Not applicable	No regional assessment has been initiated under CEAA 2012. A request for a regional assessment on a portion of the St. Lawrence River under the *Impact Assessment Act* was filed with the Minister of Environment and Climate Change in July 2020. The Minister of Environment and Climate Change (the Minister) determined on October 27, 2020, that such regional assessment has potential benefits at various levels. In order to deepen the analysis and to help define the nature, scope, objectives and results of such a assessment, the Agency conducted an engagement process with federal and provincial authorities, other interested First Nations and non-governmental organizations. The results of this process must be shared with the Minister, so that he can make a final decision on the conduct of a regional assessment.
Aboriginal and Treaty Rights	The First Nation questions the credibility of the Proponent's source that gives the opinion of Mr. René Boudreault on the southwestern part of Nitassinan. The First Nation would like to point out that the southwestern part appeared in the negotiations following the Delgamuuk decision and was a complex subject of discussion.	Changes were made to the baseline for Indigenous peoples by the Proponent.	The information provided by the First Nation regarding the southwestern portion was incorporated by the Agency in its Rights Impact Assessment and Chapter 7 on Aboriginal and Treaty Rights.

Consultation and Rights Impact Assessment	Inherent limitations of the process regarding the assessment of fees by Proponents and the Agency. Complexity of finding one's way through the many documents transmitted since the Project began in 2015.	Not applicable	In July 2019, the Agency presented the new rights impact assessment methodology to the Innu First Nations. The Agency has incorporated the NCBI's reservations regarding the use of the methodology in Chapter 7 of this report.
Pekuakamiulnuatsh First Nation (PFN)			
Birds and bird habitat	The PFN raises an issue regarding nest boxes for the Shore Swallow, a species designated as threatened under the *Species at Risk Act that* may be impacted by this project.	The Proponent conducted an inventory of the presence of shore swallows and built a nesting box in 2015, moved in 2018 and then 2019. Monitoring of the new nesting box (2018) has shown that it is used intensively by the swallows.	The Agency is satisfied with the information provided by the Proponent on the monitoring of the use of the nesting boxes installed in 2018 (moved to 2019). The Agency relies on the advice of the Canadian Wildlife Service of Environment and Climate Change Canada, which was satisfied with the results indicating that the nesting box is being used by the species. The Agency has identified the main mitigation and follow-up measures to mitigate the effects on the shore swallow, including continued monitoring of the use of the artificial nesting box.
Fish and fish habitat	Concern about the impacts of dredging. PFN calls for a long-term monitoring program in collaboration with the responsible authorities. During monitoring, if negative residual effects are identified on nearby habitats, the Proponent should take corrective or offsetting measures. The loss of 12.9 ha of habitat due to dredging must be minimally offset by an ecologically equivalent area. An offset program must include an additional area to offset the residual effects on surrounding habitats resulting from the operation of the wharf. Also, an additional area should offset the response time (effectiveness) when offsetting measures are put in place.	In order to reduce the effects of the Project and ensure a certain efficiency during dredging, the Proponent favours hydraulic dredging for non-contaminated sediments and mechanical dredging for the surface layer, contaminated sediments and sediments surrounding contaminated sediments. The Proponent submitted an offset program to offset the effects of the destruction and alteration of fish habitat, which is intended to provide similar or higher quality feeding habitat.	The Agency notes that dredging would result in the loss of feeding and relocation habitat for both sturgeon species. The Agency is relying on advice from Environment and Climate Change Canada to determine that the rigorous implementation of mitigation, monitoring and follow-up measures during the various phases of the Project would reduce the effects of sediment management and dredging activities on the aquatic environment. The Agency has identified key measures that could mitigate several potential effects of the Project on fish in Section 5.4, including the effects of dredging.
Maritime transport	Concerns about the impacts of maritime transport on beluga whales.	According to the Proponent, the increase would be 3 boats per week, or about 156 more boats per year. Beluga whales are not included in the environmental assessment of the Project because they are not found in the study area.	Information regarding the expected increase in marine traffic was shared with the First Nation. Although the increase in marine traffic outside the Project study area is outside the scope of the environmental assessment, the Agency has integrated the concerns of the Innu First Nations in Chapter 7 on Aboriginal and treaty rights.
Cumulative effects	Concerns about the cumulative effects of port and plant projects along the St. Lawrence Seaway.	A concern outside the scope of the environmental assessment for the Proponent.	PFN's concerns have been incorporated into Chapter 7 on Rights Impact Assessment. Cumulative effects are one of the criteria used to assess the extent of the Project's impacts on rights. According to the Agency, in relation to cumulative effects on fishing rights, the impacts on rights would be of high severity. The Agency assesses the cumulative effects of the Project in combination with the effects of other past, present and reasonably foreseeable projects on the current use of lands and resources for traditional purposes within appropriate geographic and temporal boundaries (Section 6.3).
	Requests that the Federal Government conduct a regional assessment to assess the cumulative effects of navigation on a regional scale.	Not applicable	No regional assessment has been initiated under CEAA 2012. A request for a regional assessment on a portion of the St. Lawrence River under the *Impact Assessment Act* was submitted to the Minister of Environment and Climate Change in July 2020. Over the coming months, the Agency conducted an engagement process with federal and provincial authorities, other interested First Nations and non-governmental organizations. The results of this process must be shared with the Minister, so that he can make a final decision on the conduct of a regional assessment.

Aboriginal and Treaty Rights	The First Nation questions the credibility of the Proponent's source that gives the opinion of Mr. René Boudreault on the southwestern part of Nitassinan. The First Nation would like to point out that the southwestern part appeared in the negotiations following the Delgamuuk decision and was subject to complex discussions.	The reference in question has been removed and an adjustment is made to the presentation of indigenous peoples by the Proponent.	The information provided by the First Nation regarding the southwestern portion was incorporated by the Agency in its Rights Impact Assessment and Chapter 7 on Aboriginal and Treaty Rights.
Consultation and Rights Impact Assessment	According to the First Nation, there is no real tool to enable the Proponent to get a fair picture of the impacts of its project and the cumulative effects on the rights of First Nations. As a result, the Proponent's assessment of the impacts on rights is unsatisfactory.	Not applicable	The cumulative effects of the Project on rights are assessed by the Agency in Chapter 7 and based on the new Rights Impact Assessment methodology was presented to the First Nation in July 2019. Cumulative effects on uses are assessed in Section 6.3.
Pessamit Innu First Nation (PIFN)			
Fish and fish habitat	The Innu Council of Pessamit would like more information on fish habitat offset plans.	The Proponent submitted an offset program to offset the effects of the destruction and alteration of fish habitats, including the development of feeding habitats of similar or higher quality.	Section 5.4 of this report presents the baseline conditions as well as the potential effects of the Project on fish and fish habitat. The Agency is of the opinion that the Project would result in significant residual adverse environmental effects on fish and fish habitat, and special status species due to the destruction and permanent alteration of habitat. The Project would cause significant habitat loss and negatively affect several species, including striped bass, lake sturgeon, Atlantic sturgeon and American shad. The Agency forwarded DFO's final advice regarding the effects of the Project on fish and fish habitat, including effects on migratory species, to the First Nation. The Agency has identified the main measures likely to mitigate several potential effects of the Project in Section 5.4. However, these measures taken together would not sufficiently mitigate the potential effects of the Project to render the residual effects insignificant.
Socio-economic conditions	The Proponent must include in the mitigation measures actions aimed at taking into account the particularities of the workforce, socio-economic catch-up initiatives and strategies encouraging the integration, development and valorization of the Indigenous workforce.	The Proponent has indicated that it will put in place a mechanism to inform First Nations representatives of employment opportunities and potential calls for tenders, in the form of email messages, when they arise. However, the Proponent has indicated that it cannot guarantee or reserve a number of jobs for First Nations members.	The Agency asked the Proponent questions about how the Proponent plans to promote the integration and development of the Indigenous workforce. In its environmental assessment, the Agency considers the effects of changes to the environment on economic issues. The Agency does not assess direct effects on job creation under CEAA 2012.
Maritime transport	Concerns about the impacts of an increase in maritime traffic on the river (accident risks and environmental effects for coastal communities, traditional activities, economic).	The Proponent has indicated that the increase would be from 1 to 3 vessels per week and will share information with the First Nation regarding regulations related to marine safety.	Information regarding the expected increase in marine traffic was shared with the First Nation. Although the increase in marine traffic outside the Project study area is outside the scope of the environmental assessment, the Agency has integrated the concerns of the Innu First Nations in Chapter 7 on Aboriginal and treaty rights. Section 6.1 identifies the risks inherent to the Project as well as the key mitigation measures related to the risks of accidents and malfunctions.
Cumulative effects	Concerns about the cumulative effects of different projects on Nitassinan. Questions about the possibility for the Agency to assess cumulative effects in a comprehensive manner.	A concern outside the scope of the environmental assessment for the Proponent.	The Agency assessed the Project's impact on rights, Chapter 7, including the cumulative effects criterion. Section 6.3 presents the assessment of the cumulative effects of the Project on current uses for traditional purposes.
Innu First Nations (IFN) joint comments on the draft report			
Cultural Heritage	According to the FNI, the Project area has been interesting and nurturing for human life since time immemorial.	Not applicable, comment for the Agency.	Comment added in Final report (5.10.1).
Current Use of Lands and Resources	Some members of the IFN hunt migratory birds in the vicinity of the expanded study area. The IFN are concerned that increased disturbance around the Project will create more competition for the hunting sites used by their members.	According to the Proponent, the hunting of migratory birds would only be affected during the hours when work would take place, during the construction period, because the birds could leave the construction zone. According to the Proponent, a Huron-Wendat hunting site would be affected on the shores of Baie de Beauport. The Proponent did not address the issue of competition between hunters due to the potential displacement of disturbed hunters on the Project site and in the vicinity.	Comment added in the Final report (5.9). The Agency considers that the effects of the Project on the practice of hunting by the Innu would be limited, but has added a condition aimed at monitoring Aboriginal hunting of migratory birds within the APQ's area of jurisdiction so that corrective measures can be implemented if required.

	For IFN, the exercise of rights by their members living off-reserve site is increasingly difficult. The Beauport Bay site is one of the last places in the area that still offers the possibility for IFN members living in this area to access the river and its shores to practice their traditional activities.	The Proponent has committed to examining the possibility of providing free access for First Nations members to boat launching ramps on the territory under its jurisdiction (Englobe, 2020f).	Comment added in the Final report (Subsection 6.3.3. and Chapter 7). The Agency is proposing a condition to facilitate access to the territory under its jurisdiction by First Nations during the construction and operational phases.
	Concerns about increasing vessel size in addition to increasing vessel traffic.	Not applicable, comment for the Agency.	Comment added in the subsections on rights (7.2.1) and on socio-economic conditions (5.8.2: Effects of increased marine traffic on commercial and recreational navigation). The Agency considers that the increase in marine traffic generated by the Project would be low and that, given the mitigation measures proposed by the Proponent, it would not significantly disrupt recreational and tourism activities in the Project area. However, the Agency considers that the type and size of container ships expected at the new terminal could increase the navigational risks for small craft. Indeed, the Agency shares the concerns of the Innu First Nations regarding the arrival of these new types of vessels. However, these vessels will navigate at low speed in the vicinity of the terminal, which would allow small craft to modify their routes to avoid them. The Agency also considers that key mitigation measures would mitigate the safety risks associated with the cohabitation of large vessels and recreational boating.
Aboriginal and Treaty Rights	In addition to access, experience and resource, the IFN feel that “the social and environmental acceptability of the practice must be encouraged and established. This right can be impacted by the lack of recognition of the importance of the practice for IFN by Aboriginal people, stakeholders and governments”.	The Proponent has made a commitment to the First Nations to implement a project to recognize and commemorate the multinational Aboriginal presence on the Project site.	Comment added to Chapter 7 (Aboriginal and Treaty Rights). In addition to the three impact pathways identified by the Agency, the IFN also identified a fourth pathway, that of the recognition of the importance of the practice of traditional activities for the IFN by the non-Aboriginal people, the stakeholders and the governements. The Agency issued a condition that the Proponent, in consultation with the First Nations, implement an initiative to commemorate the Aboriginal presence in the area of the Project.
	The Project will also have effects further downstream. In addition to the potential effects on safety and the environment, the increase in merchant marine traffic is causing a steady increase in the appropriation of the St. Lawrence River by the merchant marine. Accessible and affordable practices for traditional and food fisheries, hunting (birds, seals) and other navigational activities are falling victim to these constant and growing constraints.	In order to analyze and manage as much as possible the potential effects of the Project on downstream navigation, the Proponent has made a commitment to the Innu First Nations to develop a vessel monitoring program, particularly in the sector between the approach to the Les Escoumins pilot station and the mouth of the Saguenay. This program would involve the user members of the community and the Innu First Nation businesses that operate in this sector.	Comment added to Section 5.8 (Socio-economic conditions) on the effects of increased vessel traffic on commercial and recreational navigation. The effects are not within the scope of the Project. However, concerns have been added to the report in Chapter 7 (Aboriginal and Treaty Rights).
Conditions	The IFN request that condition 11.2 be amended to ensure that the Project related to the visual barrier commemorates the Aboriginal presence of all Nations historically present in this area.	The Proponent has made a commitment to the First Nations to implement a project to recognize and commemorate the multinational Aboriginal presence on the Project site.	The Agency has added a condition (11.3): “The Proponent shall develop, in consultation with First Nations, and implement, as part of the Project, an initiative to commemorate the Aboriginal presence in the Project area”.
	IFN request that the Proponent provide easy, recognized and cost-free access to their First Nation members at all sites open to the public in their jurisdiction.	The Proponent has committed to examining the possibility of providing free access for First Nations members to boat launching ramps on the territory under its jurisdiction (Englboe, 2020f).	A measure to facilitate this access for First Nations has been added: “The Proponent shall, prior to construction and in consultation with First Nations, develop and implement measures to facilitate First Nations access to the territory under the jurisdiction of the Proponent during construction and operation”.
	In the absence of offset for the loss of striped bass spawning habitat, IFN suggested that the Proponent advance its study intentions. The IFN expressed concern to the Proponent about the potential for funding shortfalls associated with habitat connectivity offset projects.	The Proponent submitted to the Agency in December 2020 and March 2021 new information and refinements to the avoidance, mitigation and offsetting measures related to the residual impacts of the Project on fish and fish habitat.	These comments have been forwarded to DFO for consideration should the Project proceed and require authorization under the *Fisheries Act*.
	IFN wish to be consulted on migratory bird monitoring programs as appropriate.	Not applicable, comment for the Agency.	IFN have been added to this monitoring, which, however, concerns only the bank swallow. The Agency has also added a condition on the monitoring of migratory bird hunting in the APQ’s jurisdictional area.

Mohawk Council of Kahnawà:ke (MCK)			
Project Rationale	Requires a demonstration of the need for and viability of the Project. Questions regarding the economic justification of the Project.	The Proponent presented information on the rationale for the Project, based in part on the current shortage of space and congestion at the terminals. According to the Proponent, the expansion of the Port of Québec will help take full advantage of the assets of the St. Lawrence trade corridor and the opportunities for Canada in international trade (Englobe, 2020a). The Proponent presented the Project's rationale and location at a meeting held in November 2018 and indicated its willingness to meet again with MCK representatives to discuss the Project further, if necessary.	Several questions related to the Project's rationale were forwarded to the Proponent, and the Proponent's responses to these questions are available on the Canadian Environmental Assessment Registry. The Agency may request clarification on the economic issue that justifies the Project, but does not comment on the accuracy of the information provided. Elements concerning the Project justification are found in Chapter 4 of this report.
Fish and fish habitat	Concern about the implementation of a offset plan for the 20 ha lost. Concerns about effects on fish and fish habitat, specifically: striped bass, lake sturgeon and American shad. The MCK requires complete information regarding fish and fish habitat and planned offset plans.	The potential effects of the Project on aquatic fauna and its habitats were assessed by the Proponent in its impact statement. Additional information was shared in its responses to the Agency's requests for information. The Proponent submitted an offset program to offset the effects of the destruction and alteration of fish habitats, including the development of feeding habitats of similar or higher quality.	Section 5.4 of this report presents the baseline conditions as well as the potential effects of the Project on fish and fish habitat. The Agency is of the opinion that the Project would result in significant residual adverse environmental effects on fish and fish habitat, and special status species due to the destruction and permanent alteration of habitat. The Project would cause significant habitat loss and negatively affect several species, including striped bass, lake sturgeon, Atlantic sturgeon and American shad. The Agency is relying on the advice of Fisheries and Oceans Canada, which considers that offset of lost spawning habitat would not be possible given the nature and complexity of the features that are attractive to striped bass. The harmful effects of the Project could not be mitigated, avoided or controlled by measures consistent with the recovery plan for the species. The Agency forwarded DFO's final advice regarding the effects of the Project on fish and fish habitat, including effects on migratory species, to the First Nation. Two meetings were also organized by the Agency between DFO and MCK representatives regarding this advice. The Agency has identified the main measures likely to mitigate several potential effects of the Project in Section 5.4. However, these measures taken together would not sufficiently mitigate the potential effects of the Project to render the residual effects insignificant.
	Striped bass status, the current population of striped bass in the St. Lawrence River is assessed as endangered, as it has been since 2012. Some parts of the Agency's report could be misinterpreted as to the status of the species.	Not applicable, comment for the Agency.	A modification was made, particularly to Table 11 to distinguish the historical population from the current population.
	Aboriginal and stewardship rights related to striped bass, sturgeon and American shad.	Not applicable	The Agency has assessed the impacts of the Project on Aboriginal and treaty rights in Chapter 7 of this report. The Agency concludes that the Project will have a high degree of impact on rights, particularly due to impacts on the right to fish. The stewardship component was also included in the Agency's assessment.
Maritime transport	Concerns about the increase in maritime traffic and its effects on access to the river and the practice of rights by members. Concerns regarding mitigation measures related to transportation.	The Proponent states that no increase in marine traffic is expected between Québec City and Montréal and that the assessment of the cumulative effects of marine transportation is outside the scope of the environmental assessment of the Project.	The Agency shared information regarding the anticipated increase in marine traffic to the First Nation. Although the increase in marine traffic outside the Project study area is outside the scope of the environmental assessment, the Agency has incorporated the MCK's concerns into Chapter 7 on Aboriginal and Treaty Rights. The Agency identified the main measures likely to reduce the risk of accidents and malfunctions in Section 6.1. According to the Agency, no increase in traffic generated by the Project is expected between Québec City and Montréal. Consequently, no effect related to marine transportation generated by the Project is expected on access and experience in the territory by the Mohawks of Kahnawà:ke. A meeting dealing specifically with marine transportation was organized by the Agency with the MCK and Transport Canada.

	Concerns about the introduction of invasive species from ships.	The Proponent indicates that the risk of contamination of the mule mussel (freshwater mussel) population by ships' ballast water will be accentuated by the modification of ships' transit and by the greater capacity of these ships involving larger ballast volumes. For the construction phase, the Proponent proposes to inspect dredges and other watercraft used in the aquatic environment before they arrive on the construction site to ensure that they are free of invasive alien species.	The Agency held a meeting with MCK during which Transport Canada responded to this concern by presenting federal regulations in terms of ballast water management.
Cultural Heritage	An archaeological survey should be conducted prior to the start of work and not only if artifacts are discovered during the construction period.	In addition to the archaeological potential study, an underwater geophysical survey and a sediment profiler survey were carried out in the construction site by the Proponent. The Proponent proposed an archaeological intervention plan that it would implement prior to the start of work and continue throughout all phases of the Project.	The Agency has identified the main measures likely to reduce the potential effects on cultural heritage in Section 5.10, including the presentation to First Nations who have expressed the wish to do so, of the results of the work planned in the archaeological plan and the annual report on the results of the archaeological monitoring.
Cumulative effects	Numerous concerns related to the cumulative effects of various projects along the St. Lawrence, particularly port projects and the resulting increase in maritime traffic (effects on fishing rights, cultural practices, language, transmission of knowledge).	A concern outside the scope of the environmental assessment for the Proponent.	MCK's concerns have been incorporated into Chapter 7 on Rights Impact Assessment. Cumulative effects are among the criteria used to assess the extent of the Project's impacts on rights. According to the Agency, in relation to cumulative effects on fishing rights, the impacts on rights would be of high severity. The Agency assesses the cumulative effects of the Project in combination with the effects of other past, present and reasonably foreseeable projects on the current use of lands and resources for traditional purposes within appropriate geographic and temporal boundaries (Section 6.3).
	Request from MCK to conduct a regional assessment forwarded to the Minister of Environment and Climate Change in July 2020 under subsection 97(1) of the *Impact Assessment Act*. According to the MCK, this assessment is necessary for the Crown to fulfill its duty to consult.	Not applicable	A meeting was held between the Agency and the MCK regarding this request. The Minister of Environment and Climate Change (the Minister) has determined that such regional assessment has potential benefits at various levels. In order to deepen the analysis and help define the nature, scope, objectives and results of such assessment, the Agency conducted an engagement process with federal and provincial authorities, the MCK, other interested First Nations and non-governmental organizations. The results of this process, to be shared with the Minister, will enable him to make a final decision on the conduct of a regional assessment. However, the regional assessment cannot be completed before the completion of the environmental assessment of the Laurentia Project.
	The MCK has requested further discussions with the Agency on the issue of cumulative effects.	Not applicable	Consultation with the Agency is ongoing. Consultation on the Agency's draft report may, at the request of the MCK, include a meeting on the issue of assessing the cumulative effects of the Project.
Aboriginal and Treaty Rights	Iroquoian presence in the Beauport area. The MCK requested modifications to the reference conditions presented by the Proponent concerning Indigenous peoples and the presence of Mohawks in the study area. The MCK asserts that it holds rights in the study Area.	The Proponent has made changes related to the presence of Iroquoian groups in the study area.	The Agency has incorporated information shared by the MCK regarding their rights and historical presence in the study area into the rights impact analysis and Chapter 7.
	The MCK believes that the “Other Measures” proposed by the Agency do not constitute adequate accommodation of the adverse impacts of the Project on Aboriginal rights.	Not applicable, comment for the Agency.	The Agency has qualified this section in the Final report. The Agency is aware that these two initiatives would not be adequate accommodations, particularly since the results would not be available until the end of the assessment. However, the Agency notes the value of these two initiatives in relation to the issues raised by First Nations regarding cumulative effects.
	Striped bass is also a species of interest to the First Nation, which also hopes to be able to fish this resource again when the conditions are right.	Not applicable, comment for the Agency.	The Agency has added striped bass to the species of importance to the First Nation.

	Lake sturgeon is also a species of interest to the Mohawks of Kahnawà:ke and future striped bass fishing is also of interest to the First Nation if the population recovers.	Not applicable, comment for the Agency.	These elements have been added to the Final report.