Énergie Saguenay Project

DRAFT ENVIRONMENTAL ASSESSMENT REPORT

September 2021

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

Canada

Catalogue No: EnXXX-XXX/XXXXF

ISBN : XXX-X-XXX-XXXXX-X

This document has been issued in French under the title:
Projet Énergie Saguenay – Rapport provisoire d'évaluation environnementale

Summary

GNL Québec Inc. (the Proponent) is proposing the construction and operation of a natural gas liquefaction facility and export terminal located in the district of La Baie, Saguenay City, Quebec. The site of the Project is located near the Grande-Anse marine terminal (Port of Saguenay). The Énergie Saguenay Project (the Project) would liquefy approximately 44 million cubic metres of natural gas per day (Mm^3/d). It would have a liquefied natural gas nameplate production capacity of 10.5 million tons per year (Mtpa). The liquefied natural gas would mainly be bound for export to world markets. The main infrastructure would be the natural gas liquefaction facilities, port facilities for loading of liquefied natural gas tankers, liquefied natural gas storage tanks and support facilities. The wharf would be designed to accommodate two tankers with a capacity of 100,000 deadweight tonnage (DWT). The projected operating period of the liquefaction facility would be 25 to 50 years. The construction phase could begin in 2022.

Under the *Canadian Environmental Assessment Act* (2012), the Project is subject to an environmental assessment by the Impact Assessment Agency of Canada (the Agency), because it includes activities described as follows in the schedule to the *Regulations Designating Physical Activities*:

- 14(d) The construction, operation, decommissioning and abandonment of a new facility for the liquefaction, storage or regasification of liquefied natural gas, with a liquefied natural gas processing capacity of 3,000 t/day or more or a liquefied natural gas storage capacity of 55,000 t or more.
- 24(c) The construction, operation, decommissioning and abandonment of a new marine terminal designed to handle ships larger than 25,000 DWT unless the terminal is located on lands that are routinely and have been historically used as a marine terminal or that are designated for such use in a land-use plan that has been the subject of public consultation.

The Project includes marine transportation between the site of the natural gas liquefaction facility located in the Saguenay River and the municipality of Les Escoumins, located in the St. Lawrence Estuary.

The Project is subject to an environmental assessment by the Government of Quebec under the *Environment Quality Act*. The provincial and federal governments are cooperating according to the principles of the Canada-Quebec Agreement on Environmental Assessment Cooperation. On July 21, 2021, the Quebec government announced that it was refusing the Project, a decision formalized by an order-in-council published on August 11, 2021. Despite the Province of Quebec's decision, the proponent has indicated its intention to continue with the Agency's environmental assessment of the Project. However, the proponent will be required to obtain all necessary federal and provincial approvals and permits to allow the project to proceed.

This environmental assessment draft report was prepared after a technical review of the Proponent's Environmental Impact Statement and additional documents, and after an assessment of the potential environmental effects of the Project by the Agency, supported by the Environmental Assessment Committee comprised of Environment and Climate Change Canada, Fisheries and Oceans Canada, Health Canada, Parks Canada, Transport Canada, Natural Resources Canada, the Saguenay Port Authority, the Laurentian Pilotage Authority, and the Canadian Coast Guard.

In the context of the environmental assessment, the Agency considered the concerns and comments of the Innu First Nations of the Essipiunnuat, the Pekuakamiulnuatsh and the Pessamiulnutsh, the Huron-Wendat Nation and the Wolastoqiyik Wahsipekuk First Nation. It considered the comments of citizens' groups, environmental and economic groups and the general public.

To conduct this assessment, the Agency reviewed the effects the Project is likely to cause on the following components:

- Those under federal jurisdiction, as described in subsection 5(1) of the *Canadian Environmental Assessment Act* (2012);
- Those directly related to federal decisions enabling the Project to be carried out, or arising from it, in accordance with subsection 5(2) of the *Canadian Environmental Assessment Act* (2012);
- The species listed in Schedule 1 of the *Species at Risk Act* and their critical habitat;
- The species designated by the Committee on the Status of Endangered Wildlife in Canada;

The Agency also considered the factors indicated in subsection 19(1) of the *Canadian Environmental Assessment Act* (2012). The environmental assessment conducted by the Agency highlighted the following main potential environmental effects:

- Significant effects resulting from greenhouse gas emission based on the magnitude of the Project's contribution to greenhouse gases and its impact on the achievement of Quebec's and Canada's greenhouse gas emission and climate change targets;
- Significant direct and cumulative effects on marine mammals, including the beluga whale, particularly based on the effects of underwater noise on the St. Lawrence beluga, which is contrary to the objectives of the recovery programs for marine mammals at risk in the St. Lawrence Estuary as well as the protection mandate of the protected area;
- Moderate effects on fish and fish habitat resulting from the Project's infrastructure and activities that would occur in the water and near the water and that could lead to the mortality and disturbance of individuals and the loss and alteration of the aquatic habitat, particularly by encroachment, noise and water quality;
- Moderate effects on vegetation and wetlands due to losses or alterations caused by the presence of the Project's infrastructure or activities;
- Moderate effects on birds, their eggs and their nests, as well as losses and disturbances of their habitat caused by the Project's infrastructure and activities, which could generate disturbance by noise or luminosity and the human presence;
- Moderate effects on certain special status terrestrial species, particularly due to disturbance by noise and luminosity triggered by the Project's infrastructure and activities;
- Moderate effects on the current use of lands and resources by the Innu First Nations of the Essipiunnuat, the Pekuakamiulnuatsh and the Pessamiulnutsh, and by the Huron-Wendat Nation for the purposes of fishing and cultural practices, particularly due to the increase in marine traffic;
- Significant direct effects on the cultural heritage of the Innu First Nations, given the disturbance of marine mammals that would be caused by the increase in marine traffic;

- Moderate effects on the socioeconomic conditions of the local and regional communities, including the First Nations, whose recreational tourism businesses depend on the advantages of the natural landscapes and biodiversity of the Saguenay Fjord and the St. Lawrence Estuary;
- Moderate effects on human health (physical and psychological) resulting from atmospheric contaminant emissions, surface air quality, noise and light emissions caused by the Project's infrastructure and activities.

The Proponent is committed to implement mitigation measures that would avoid or minimize the adverse potential effects of the Project. Compensation measures are also proposed to counterbalance the adverse potential effects. The Agency has determined the key mitigation measures that contribute to eliminate, reduce and limit of the significant adverse environmental effects based on the measures proposed by the Proponent and taking into account the views of the government authorities and the comments received from the First Nations and the public.

Finally, this report presents the Aboriginal and treaty rights of the above-mentioned First Nations, which could be affected by the Project. The Agency considers that the Project would have negative impacts of moderate to high severity for the Innu First Nations and of moderate severity for the Huron-Wendat Nation, both direct and cumulative, on the exercise of these rights. The Wolastoqiyik Wahsipekuk First Nation, for its part, indicated in its exchanges with the Agency that it does not have information on the exercise of rights by its members in the part of its territory overlapping the Project study area. Consequently, it agreed with the Agency not to conclude on the scope of potential impacts of the Project on its rights and uses.

If the Minister of Environment and Climate Change determines that the Project is likely to cause significant adverse environmental effects, he will refer to the Governor-in-Council the question of whether these effects are justified in the circumstances. If the Governor-in-Council decides that these effects are justified in the circumstances, the Minister will set out legally binding conditions for the Project for the Proponent under the *Canadian Environmental Assessment Act* (2012).

Table of contents

List of Tables

List of Figures

List of Abbreviations and Acronyms

Abbreviation/Acronym	Definition
ABCA	Aquatic bird concentration area
BAPE	Quebec's Environmental public hearing office - Bureau d'audiences publiques sur l'environnement
CAAQS	Canadian ambient air quality standards
CCME	Canadian Council of Ministers of the Environment
CEAA 2012	*Canadian Environmental Assessment Act, 2012*
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
DWT	Deadweight tonnage
ECRC	Eastern Canada Response Corporation
HAZID	Hazard identification
IAA	*Impact Assessment Act*
IBA	Important bird area
MELCC	Quebec's Ministère de l'Environnement et de la Lutte contre les changements climatiques
SARA	*Species at Risk Act*
SAURT	Indigenous knowledge and use of resources and the territory - Savoir autochtone et l'utilisation des ressources et du territoire
SPEDE	Quebec's cap and trade system for greenhouse gas emissions allowances - Système de plafonnement et d'échange de droits d'émissions)
TERMPOL	Technical review process of marine terminal systems and transshipment sites
The Agency	Impact Assessment Agency of Canada
The Minister	Minister of Environment and Climate Change

The Project	Énergie Saguenay Project
The Proponent	GNL Québec inc.
The Regulations	*Regulations Designating Physical Activities*
This report	Draft environmental assessment report

Glossary

Abbreviation/Acronym	Definition
Accident	In the context of environmental assessment, an accident is described as an unexpected and sudden event involving components or activities of the Project, which leads to damage to valued components.
Ballast Water	Refers to water and suspended solids taken aboard a ship to control the ship's stability. In general, it must be expected that various bacteria or other microbial organisms, microalgae, aquatic plants and animal species (crustaceans, shellfish, fish, etc.) will be found in ballast water.
Benthic Fauna	Animal species living at the bottom of the water.
Benthic Habitat	Includes the surface of the sediment and certain layers of the subsoil.
Carbon Neutrality	Results from a carbon balance equal to net zero emissions for each year of operation in the perimeter defined by the company
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 in an action plan developed for the species.
Echolocalisation	Means of locating obstacles or prey, used by various animals living in the dark (bats) or in the water (whales), and consisting of emitting ultrasound or high-pitched sounds and assessing the return time of their echo in various directions.
Ecodriving	Ecodriving is defined as the application of driving tips and techniques that reduce a vehicle's fuel consumption for the same service. Central to this new way of driving is the effective management of acceleration and deceleration. Engine idling is also an important fuel consumption factor over which the driver has direct control.
Environmental Impact Statement	A detailed technical document prepared by the proponent of a designated project subject to assessment under the *Canadian Environmental Assessment Act, 2012.* It identifies the potential adverse environmental effects of a designated project, including cumulative effects and proposed measures to mitigate those effects.

Epibenthic Organism	Organism living on the surface of the substrate in the benthic zone, without being a burrowing organism.
Federal Lands	Federal territory as defined in the *Canadian Environmental Assessment Act* (2012).
Fine Particulate Matter ($PM_{2.5}$)	Particulate matter with a diameter of 2.5 micrometres or less.
Fish	As defined in the *Fisheries Act*, fish and fish parts, molluscs, crustaceans, marine animals and their parts, eggs, sperm, milt, spawn, larvae, spat and young of animals. For this Project, however, marine mammals are addressed in Section 5.2.
Floristic Species	Plant species.
Follow-up Program	A program to verify the accuracy of the environmental assessment of a designated project and to judge the effectiveness of measures to mitigate adverse environmental effects.
Freshwater Fish	Refers to animal and plant species that live exclusively or mainly in freshwater, as opposed to marine species.
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.
Guidelines for the Preparation of an Environmental Impact Statement	A document for the proponent outlining the information requirements for the preparation of an Environmental Impact Statement for a designated project to be assessed pursuant to the *Canadian Environmental Assessment Act, 2012*. This document specifies the nature, scope and extent of the information required.
Herpetofauna	All the reptiles and amphibians of an area (for example, turtles, snakes, frogs, salamanders).
Hibernacula	Place where the snakes will pile up in winter (rock falls, crevasses, abandoned burrows).
Hydraulicity	Average flows over long periods (month, season, year, etc.).
Innu Aitun	Innu term that refers to traditional practices in all their forms.
Intertidal Zone	Area between high and low tide levels.
Lifecycle Analysis	A lifecycle analysis consists of compiling and assessing the inputs, outputs and potential environmental effects of the product during its lifecycle, i.e., from extraction of raw materials to their use.

Malfunction	A malfunction is described as the inability of equipment or a system to function as foreseen and which leads to damage to valued components.
Mediolittoral	Qualifies the littoral zone between the mudflats of the medium tides.
Migratory Birds	Birds identified and protected by the *Migratory Birds Convention Act* and listed in the schedule to that act.
Mitigation Measures	Measures to eliminate, reduce or limit the adverse environmental effects of a designated project. This includes measures to remedy any damage to the environment caused by such effects, including replacement, restoration or compensation.
Monitoring	Implementation of periodic or continuous controls or audits, according to a predetermined schedule, on one or more environmental components. The purpose of monitoring is generally to determine the degree of compliance with established requirements or to observe the condition and trends of specific environmental components over time.
Nitassinan	In Innu Aimun, Nitassinan means the traditional territory occupied by the Innu.
Non-Migratory Birds	Birds that are not protected by the *Migratory Birds Convention Act*.
Optimal Roosting Habitat (bats)	Areas likely to be most important for these bat species. Optimal habitats include a combination of elements of interest to these species, which increases the likelihood of a roosting site.
Paleoshorelines	The study of paleoshorelines makes it possible to reconstruct past variations in sea level – in this case, the level of the Saguenay River shoreline at different points in time.
Particulate Matter (PM_{10})	Particulate matter with a diameter of 10 micrometres or less.
Pelagic Environment	Open water area just above the bottom.
Percentage of the Population Highly Annoyed (%HA)	The percentage of the population highly annoyed (%HA) is used to calculate how a typical community responds to a given noise level (dose-response relationship between noise levels and annoyance generated according to ISO-1996-1). Health Canada recommends that noise impact be assessed in terms of changes in the %HA of 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 establishing the existence of a severe noise-related impact from a project.

Phytosociological	Phytosociology is the science of studying the relationships between the vegetation communities and their ecosystem, including human societies.
Precautionary Principle	The Precautionary Principle was enacted at the Rio Conference on Biological Diversity (1992), which states that “where there are threats of serious or irreversible damage, lack of full certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation...”
Residency (of a Species)	As defined in the *Species at Risk Act*, a den (burrow, nest or other similar area or place) occupied or usually occupied by one or more individuals during all or part of their lives, including breeding, rearing, staging, wintering, feeding or hibernating.
Species at Risk	Species at risk include species that appear on the lists under the federal legislation. The effects on species at risk are assessed in accordance with section 79 *Species at risk act* and account for species for which the Committee on the Status of Endangered Wildlife in Canada (COSEWiC) recommends changing their status or adding them to the list of species at risk.
Study Area	Project study area defined in Section 1.2 of the report.
Subtidal Zone	Coastal area below mean low tide level.
Suspension Feeder	Organism which collects food by filtering the environment with nets or any external mechanism allowing collection of particulate or planktonic food and food suspended in water.
Total Particulate Matter (TPM)	The totality of particles suspended in the air.
Waterfowl	Refers to wild waterfowl such as ducks and geese.
Wave Action	All of the waves produced by the wake of the boats and that break against the shores result in their degradation.

1. Introduction

GNL Québec Inc. (the Proponent) is proposing the construction and operation of a natural gas liquefaction complex and export terminal located in the borough of La Baie, Ville de Saguenay, Quebec. The site of the Project is located near the Grande-Anse marine terminal (Port of Saguenay) (Figure 1). The Énergie Saguenay Project (the Project) would allow liquefaction of approximately 44 million cubic metres of natural gas per day (Mm^3/d). It would have a rated production capacity of 10.5 million tons per year (Mtpa) of liquefied natural gas. The liquefied natural gas would mainly be bound for export to world markets. The main infrastructure would be the natural gas liquefaction facilities, port facilities for loading of liquefied natural gas tankers, liquefied natural gas storage tanks and support facilities. The wharf would be designed to accommodate vessels with a capacity of 100,000 deadweight tonnage (DWT). The projected operation period of the liquefaction complex would be 25 to 50 years. The construction phase is scheduled for 2022.

The Proponent estimates that the Project will necessitate a total investment of nine billion Canadian dollars and provides for the creation of approximately 4,000 direct jobs and 2,000 indirect jobs during the construction phase and approximately 250 to 300 direct jobs and 1,000 indirect jobs during the operational phase.

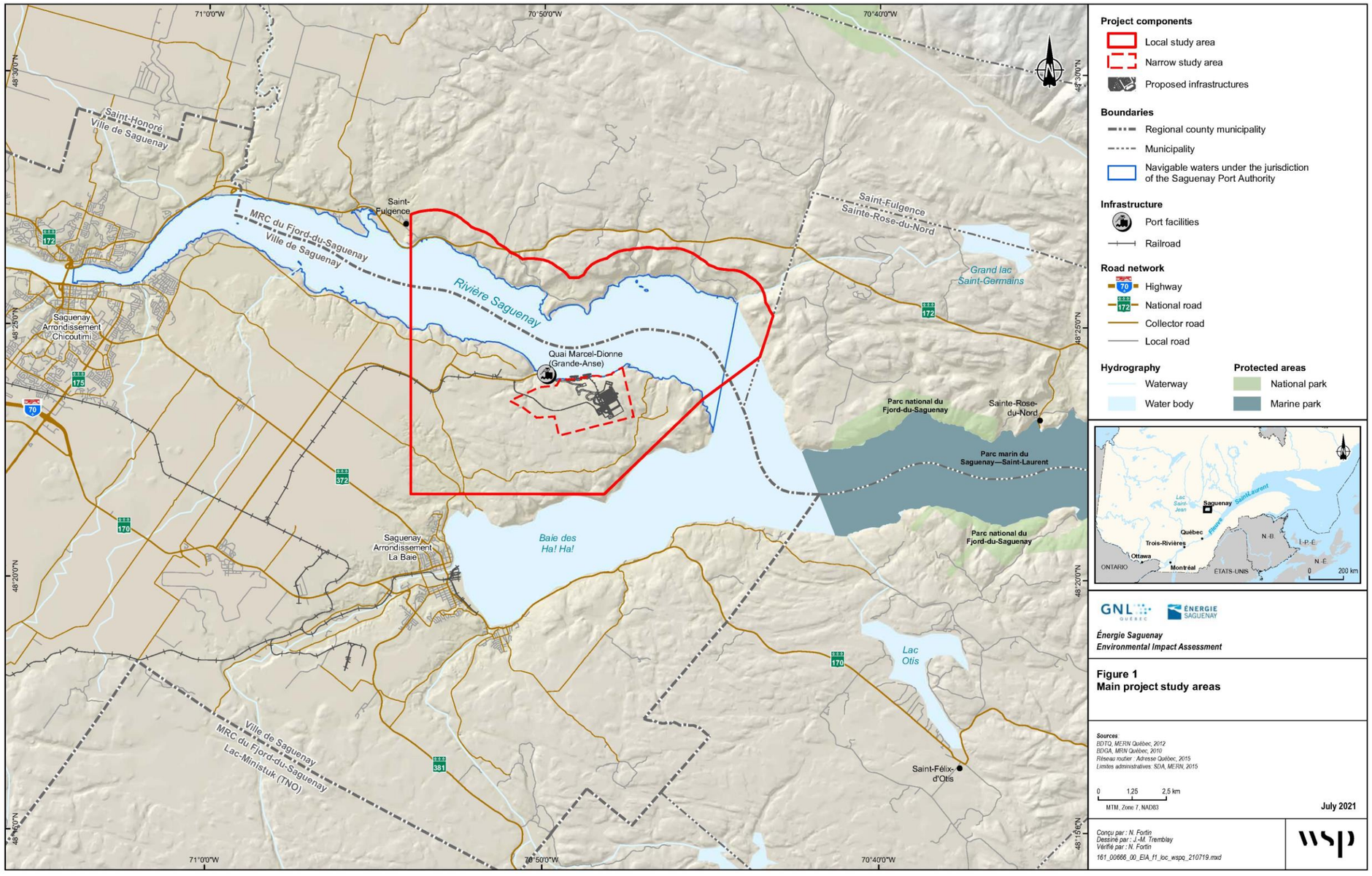
1.1 Purpose of the Environmental Assessment Report

This interim environmental assessment report provides a summary of the assessment made by the Impact Assessment Agency of Canada (the Agency), including the information and analyses the Agency considered to establish whether the Énergie Saguenay Project is likely to result in significant negative environmental effects after the deployment of the proposed mitigation measures.

The Minister of the Environment and Climate Change will review the final environmental assessment report, which will take into account the comments of the Indigenous peoples[1], the public, the Proponent and the federal authorities on this interim version, before rendering its decisions under the *Canadian Environmental Assessment Act (2012)* (CEAA 2012).

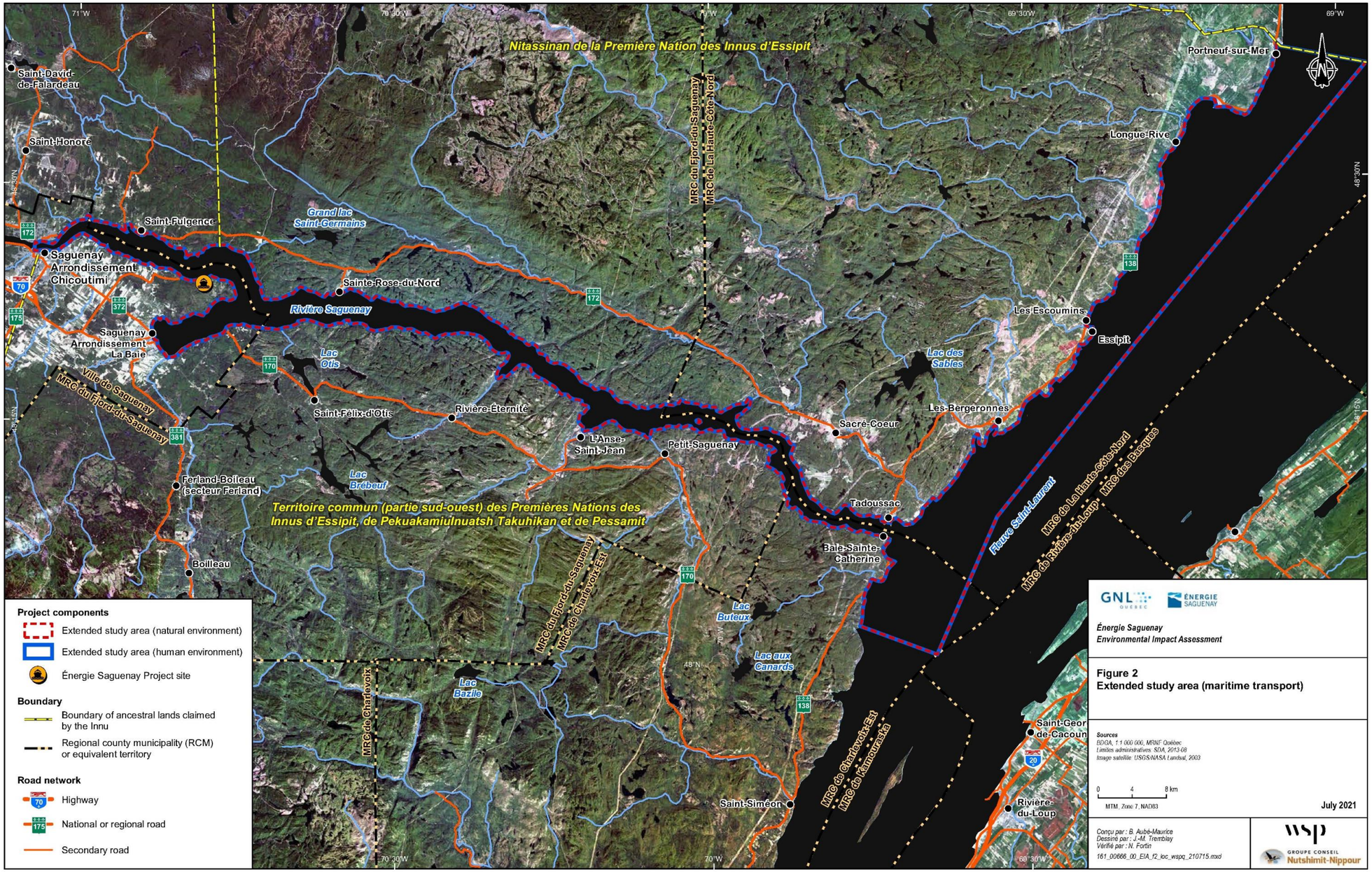
[1] First Nations consulted: Essipit Innu First Nation, Pekuakamiulnuatsh (Mashteuiatsh) First Nation, Innu First Nation of the Pessamit, Huron-Wendat Nation and Wolastoqiyik Wahsipekuk First Nation.

Figure 1: Location of the projected Infrastructure of the Énergie Saguenay Project in La Baie Borough of Ville de Saguenay and Local Study Area (Dotted Red Line) and Restricted Study Area (Solid Red Line).



Source: WSP, July 2021

Figure 2: Presentation of the Extended Study Areas to the Saguenay River and the St. Lawrence Estuary for the Natural Environment (Red) and the Human Environment (Blue), as Defined in the Impact Statement for the Énergie Saguenay Project.



Source: WSP, July 2021

1.2 Scope of the Environmental Assessment

1.2.1 Requirements of the Environmental Assessment

On December 3, 2015, the Agency undertook a preliminary review of the description of the Project provided by the Proponent. The review included consultations with the federal authorities, the public and the First Nations, in order to decide if an environmental assessment was required under CEAA 2012. Relying, in particular, on the comments received, the Agency determined that an environmental assessment was required and started the environmental assessment on January 15, 2016.

The Project was subject to CEAA 2012 because it includes two physical activities, each designated by the *Regulations Designating Physical Activities* (the Regulations):

- 14(d) The construction, operation, decommissioning and abandonment of a new facility for the liquefaction, storage or regasification of liquefied natural gas, with a liquefied natural gas processing capacity of 3,000 t/day or more or a liquefied natural gas storage capacity of 55,000 t or more;
- 24(c) The construction, operation, decommissioning and abandonment of a new marine terminal designed to handle ships larger than 25,000 DWT unless the terminal is located on lands that are routinely and have been historically used as a marine terminal or that are designated for such use in a land-use plan that has been the subject of public consultation.

The actual marine transportation activity between the marine terminal site in the Saguenay River and Les Escoumins located in the maritime estuary of the St. Lawrence River is part of the Project. The determination of geographic scope is based on the following:

- An area within which the Project would significantly increase vessel traffic and where the Proponent would have an influence on liquefied natural gas vessels;
- An area where Project-related marine transportation could cause potentially significant effects on beluga whales in their critical habitat, which have been the subject of concern by Fisheries and Oceans Canada, Parks Canada, the public and First Nations;
- An area within which environmental effects of marine transportation on the elements of section 5 of CEAA 2012 are most likely to occur, notably in the area of the mouth of the Saguenay River. This area supports significant biodiversity in a location where a concentration of anthropogenic activities are present and where liquefied natural gas tanker maneuvers could be unpredictable for beluga and other marine mammals and thus increase the risk of significant effects.

Shipping beyond this geographic scope in the Estuary and Gulf of St. Lawrence and its effects are not included in the scope of the Project. This decision is based on the existing regulations governing shipping and its effects on marine mammals.

Through the Whale Protection Initiative and the Oceans Protection Plan's Collaborative Initiative on the Cumulative Effects of Marine Activities on the St. Lawrence and Saguenay Rivers, the Government of

Canada is working with Aboriginal peoples, scientists, non-governmental organizations, marine industry representatives and provincial governments to better understand the potential impacts of marine transportation activities on whales and other valued components of marine and coastal ecosystems. With its partners, the Government of Canada is developing and implementing measures to protect marine mammals in the Estuary and Gulf of St. Lawrence.

Vessels bound for the liquefaction complex planned for the Project will have to comply with measures implemented by Transport Canada and Fisheries and Oceans Canada to protect vulnerable marine mammals, including North Atlantic right whale populations. For example, the Minister of Transport annually implements mandatory measures for the protection of right whales in the Gulf of St. Lawrence under the *Canada Shipping Act, 2001*, including a prohibition on vessels travelling at speeds greater than ten 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.

On August 28, 2019, the *Impact Assessment Act* (IAA) took effect and CEAA 2012 was repealed. However, in accordance with the transitional provisions of the IAA, the environmental assessment of this Project continues under CEAA 2012 as if it had not been repealed.

Finally, the Project is subject to an environmental impact assessment and review procedure by the Government of Quebec under the *Environment Quality Act*. The provincial and federal governments are cooperating according to the principles of the Canada - Quebec Agreement on Environmental Assessment Cooperation. Thus, information is shared between the governments and each party communicates with the other party during a new phase of its process. On July 21, 2021, the Quebec government announced that it was refusing the project, a decision formalized by an order-in-council[2] published on August 11, 2021. As provided for in section 62 of the Canadian Environmental Assessment Act (2012), the Agency can only terminate the environmental assessment of the Project if the proponent notifies it in writing that it no longer intends to carry out the Project. The proponent has indicated its intention to continue with the Agency's environmental assessment of the Project. However, the proponent will be required to obtain all necessary federal and provincial approval and permits to allow the Project to proceed.

1.2.2 Factors Considered in the Assessment

The Guidelines for the Preparation of an Environmental Impact Statement relating to the Project define the studies and information required from the Proponent and the factors to consider in the environmental assessment indicated in subsection 19(1) of CEAA 2012, which are as follows:

- 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 effects;
- Comments from the public;

[2] Order-in-council number 1071-2021 issued on July 21, 2021 and published on August 11, 2021 : http://www2.publicationsduquebec.gouv.qc.ca/dynamicSearch/telecharge.php?type=1&file=75419.pdf

- 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 alternatives;
- Any change to the Project that may be caused by the environment.

The Agency's environmental assessment also considers the expertise of the federal authorities and the comments of the Indigenous peoples and the public, Indigenous knowledge and community knowledge.

In addition to a decision under paragraph 5(2) of CEAA 2012, other federal decisions or the exercise of powers and duties under other federal legislation may be required to enable the Project to proceed (Table 1).

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

Federal Act	Type of federal decision that may be required	Factor, activity or effect of the Project affected by the decision
***Fisheries Act*, section 35**	Authorization	Harmful alteration, destruction or disruption of fish habitat
***Species at Risk Act*, section 73**	Agreement or permit	Activities affecting a listed wildlife species, any part of its critical habitat or the residences of its individuals
***Canadian Navigable Waters Act*, section 7**	Approval	Work that may interfere with navigation
***Canada Marine Act*, sections 28 and 46**	Exercise of powers conferred on the Saguenay Port Authority	Operate a port and acquire the land necessary to carry out the Project

In accordance with subsection 5(2) of CEAA 2012, the environmental assessment pertained to the review of changes to the environment (atmospheric, noise and light, and to surface water and groundwater) that could arise from these decisions or the exercise of these powers, and to the effects of these changes on health, socioeconomic conditions, the physical heritage, the cultural heritage, and any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.

The Guidelines for the Preparation of an Environmental Impact Statement guide the assessment by identifying the valued components likely to be affected by the Project and considered to be of concern by the Agency, the Proponent, the government agencies, the Indigenous peoples or the public. These components play a significant role in the ecosystem or are valued by humans. The Agency has targeted its assessment of the effects of the valued components under federal jurisdiction, pursuant to section 5 of CEAA 2012, as well as the species at risk under subsection 79(2) of the *Species at Risk Act* (SARA), as presented in Table 2.

Table 2: Valued Components Selected by the Agency

Valued component	Legislative requirement	Justification
Cross-border environmental effects – Greenhouse gases	5(1)(b)(ii) and (iii) CEAA 2012	The Project could lead to greenhouse gas emissions contributing to the increase in atmospheric concentrations on the global scale and climate change, which involves changes crossing provincial and international borders.
Marine mammals, including the St. Lawrence beluga whale	5(1)(a)(i) CEAA 2012 79(2) of SARA	The Project could result in the disturbance and mortality of marine mammals, including species at risk[3], including the St. Lawrence beluga, due to underwater noise and ship traffic.
Fish and their habitat, including invertebrates and species at risk[2]	5(1)(a)(i) and 5(1)(a)(ii) CEAA 2012 79(2) of SARA	The Project could lead to habitat losses and alteration of the surface water quality and current that are likely to affect fish, invertebrates and their habitats, including species at risk[2], cold-water corals and marine plants.
Vegetation and wetlands	5(2)(a) CEAA 2012 79(2) of SARA	The development of the Project's infrastructure could lead to deforestation, which could have effects on wetlands, terrestrial and riparian vegetation.
Birds and their habitats, including species at risk[2]	5(1)(a)(iii) CEAA 2012 – migratory birds 79(2) SARA	The Project could lead to habitat loss for migratory birds and species at risk[2] and could lead to disturbances due to changes in the noise and light levels.
Other species at risk[2]	5(2)(a) CEAA 2012 79(2) of SARA	The Project could lead to habitat loss and cause disturbance of species at risk[2], including bats and turtles.
Current use of lands and resources for traditional purposes by the Indigenous peoples	5(1)(c) CEAA 2012	The Project could result in changes to the environment, both terrestrial and marine, and to the overall quality of experience surrounding traditional fishing and boating that could affect the current use of lands and resources for traditional purposes by the Indigenous peoples.
Physical and cultural heritage	5(1)(c) CEAA 2012 – Indigenous peoples and 5(2)(b()ii) CEAA 2012 – population of the region	The Project could lead to the alteration of any special character-defining features of the natural or cultural heritage, or disturbances of historic or archaeological sites from the point of view of the Indigenous peoples and the population of the region.
Socioeconomic conditions	5(1)(c) CEAA 2012 – Indigenous peoples 5(2)(b)(i) CEAA 2012 – population of the region	The Project could lead to terrestrial habitat losses and transform the landscape. It could affect fish and their habitat, as well as marine mammals in relation to accidents and failures and the increase in marine transportation. This could lead to effects on the socioeconomic conditions of the Indigenous peoples and the population of the region, particularly on access to recreational and tourism activities and to recreational and commercial fishing activities, as well as on hunting and trapping.
Human health	5(1)(c) CEAA 2012 – Indigenous peoples 5(2)(b)(i) CEAA 2012 – population of the region	The Project could cause changes to air and surface water quality, and to the noise and light environments, likely to affect the human health of the Indigenous peoples and the population of the region.

[3] * Species at risk include species that appear on the lists under the federal legislation. The effects on species at risk are assessed in accordance with section 79 SARA and account for species for which the Committee on the Status of Endangered Wildlife in Canada (COSEWiC) recommends changing their status or adding them to the list of species at risk.

1.2.3 Methodology and Approach

The Agency, in collaboration with the Federal Committee (see Section 4.3), defined and assessed the negative environmental effects of the Project based on the following documents:

- The environmental impact statement submitted by the Proponent in February 2019;
- The additional information requested by the Agency since the filing of the environmental impact statement, including the answers to the information required, which have been disseminated by the Agency;
- The observations and comments received from the public and the Indigenous peoples;
- The notices received from the federal departments and agencies.

The Agency has also taken into account, in the environmental assessment draft report, the public comments filed through the Bureau d'audiences publiques sur l'environnement (BAPE).

The Agency reviewed the potential negative environmental effects of the valued components mentioned in Table 2 in accordance with the operational policy statement.[4] The direct and indirect effects of the Project that could result from the projected changes to the environment (atmospheric, sound and light, and to the surface water and ground water) were assessed. The Agency then determined the significance of the residual effects for each valued component, considering the implementation of the mitigation measures, and the surveillance, monitoring and offset programs proposed by the Proponent.

The Agency used the following criteria to characterize the significance of the residual effects, after mitigation measures, with each criterion being adapted to the valued component assessed.

- **Intensity:** Indicates the degree of disturbance (change) to which the valued component studied would be subject. The assessment of the intensity accounts for the ecological or social context of the component. The intensity can integrate the notion of the time when the effect would occur, which may refer to a phase of the component's lifecycle (migration, breeding, feeding, etc.) or a period during which a cultural, spiritual or recreational practice would be practised by a First Nation or a population (for example, the hunting season);
- **Scope:** Geographic scope over which the negative effects will persist.
- **Duration:** Time period during which the negative effects will be felt.
- **Frequency:** Rhythm at which the negative effects will recur during a given period;
- **Reversibility:** Probability that a valued component will recover from the negative effects caused by the Project.

Appendix A defines the levels of the Agency's assessment criteria for each of the valued components.

[4] Determine the probability that a designated project will lead to significant negative environmental effects under the Canadian Environmental Assessment Act (2012).

The Agency then used a grid that combines the levels attributed to each of the criteria (intensity, scope, duration, frequency and reversibility) to determine the significance of each residual effect on each valued component (see Appendix A). When the level of significance of the residual effects is high, the effects are considered significant, while the residual effects with a medium or low significance level are considered insignificant. The Agency's analyses and conclusions about the significance of the negative effects on the valued components are presented in chapters 5 and 6.

Spatial Limits

The spatial limits identify the geographic areas in which the Project's potential effects could occur. This report accounts for the following spatial limits, established by the Proponent in its impact statement:

- **Restricted study area**: It corresponds to the footprint of the Project's infrastructure in the terrestrial and marine environment and the immediate vicinity. This area covers a surface of 5.9 square kilometres (Figure 1).
- **Local study area**: It makes it possible to have an extended picture of the natural and developed territories in the vicinity of the Project site. It extends to the northwest to the core of the municipality of Saint-Fulgence to the east up to the limits of the municipalities of Saint-Fulgence and Sainte-Rose-du-Nord. On the south, it is bounded by Baie des Ha! Ha! This area covers a surface of approximately 100 square kilometres (Figure 1).
- **Extended study areas**: It allows assessment of the effect of marine transportation. It extends from the site of the Project's infrastructure in the Saguenay River to Les Escoumins in the Lower St Lawrence Estuary. This area covers a surface of approximately 3,000 square kilometres (Figure 2).

However, the promoter established study areas adapted to each valued component to adequately describe the existing conditions of the receiving environment before the Project, and to assess the Project's potential effects on each valued component.

Temporal Limits

The temporal limits account for all the activities and all the phases of the Project's lifecycle likely to cause negative effects for the environment. This report accounts for the following temporal limits, established by the Proponent in its impact statement:

- **Construction:** The construction of the liquefaction plant infrastructure and the marine infrastructure is estimated at approximately five years after obtaining the permits and authorizations.
- **Operational:** The terminal's operation begins after construction of the liquefaction infrastructure and those related to the marine terminal and continues for a period of 25 to 50 years. The operational phase of the plant and the terminal includes construction of any new infrastructure that could be required.
- **Decommissioning and closure:** The closure and dismantling phase of the liquefaction and storage facilities will be 12 months. No closure date is projected for the marine infrastructure and for the access roads, which will be conserved for subsequent use by other customers/tenants of the port industrial area, unless the Proponent receives a notice from the Saguenay Port Authority.

Cumulative Effects

Cumulative environmental effects are defined as those effects of a project that are likely to occur when a residual effect acts in combination with the effects of other projects or activities that will be or have been carried out. The assessment of cumulative effects was guided by the Agency's Operational Policy Statement[5]. In determining which components should be subject to a cumulative effects analysis, the Agency considered the significance of the residual adverse effects, the likelihood of their occurrence, the level of concern expressed by the public, consulted First Nations and government authorities, and the condition of the valued component. The Agency focused its cumulative effects analysis on the following components:

- Greenhouse gases;
- Marine mammals, including the St. Lawrence beluga whale;
- Current use of lands and resources for traditional purposes;
- Socioeconomic conditions.

The Agency excluded the other valued components from its analysis of cumulative effects given the absence or low magnitude of the anticipated residual effects of the Project on these components and the fact that these effects are unlikely to be cumulative with the effects of other past, present or reasonably foreseeable projects in the Project area.

The Agency's analysis for concluding on the significance of cumulative effects on the four valued components is presented in sections 5.1, 5.2, 5.7 and 5.9. This analysis is based on information provided by the Proponent as well as on the opinions and comments of government experts, First Nations consulted and the public.

Proponent's Approach and Scope

The proponent conducted a cumulative effects assessment in accordance with the guidelines described in the Agency's Operational Policy Statement: "Addressing Cumulative Environmental Effects under the Canadian Environmental Assessment Act (2012)" and the guide entitled, "Technical Guidance for Cumulative Environmental Effects Assessment under the Canadian Environmental Assessment Act (2012)". The proponent also used the method described in the Practitioner's Guide prepared by Hegmann and colleagues (1999) to analyze the cumulative effects of its project. This method includes the following steps:

- Identification of valued components;
- Determination of spatial and temporal scopes for each valued component;
- Identification, description and selection of past, present or future projects, actions or events that may interact with one of the valued components;
- Analysis of cumulative effects for each selected valued component;
- Development of mitigation and monitoring measures for cumulative effects.

[5] Cumulative Environmental Effects Assessment under the *Canadian Environmental Assessment Act (2012)*

The Proponent established spatial boundaries for the cumulative effects assessment based on the components analyzed. These are presented in sections 5.1, 5.2, 5.7 and 5.9.

Thirty-seven past, present or future projects and activities were identified by the Proponent, including rail service at the Grande-Anse Marine Terminal, the Marine Terminal on the north shore of the Saguenay River and the BlackRock Metals smelter (WSP, January 2019, Table 11-3). The two projects associated with the Saguenay Power Project, the power line and the natural gas pipeline, were also included. The projects and activities considered for the cumulative effects analysis on each valued component are also presented in sections 5.1, 5.2, 5.7 and 5.9.

2. Project Overview

2.1 Location of the Project and Regional Context

The proposed Project is located on the south shore of the Saguenay River, about one kilometre from the Grande-Anse facilities of the Saguenay Port Authority in the Saguenay–Lac-Saint-Jean (Quebec) administrative region, more specifically within the limits of La Baie Borough of Ville de Saguenay (Figure 1). It is situated approximately nine kilometres from the north end of the Saguenay–St. Lawrence Marine Park. Including marine transportation, the Project's geographic scope extends along the Saguenay River, from Ville de Saguenay to its mouth, and in the St. Lawrence Estuary as far as Les Escoumins.

The Project's terrestrial infrastructure would be implemented on non-Crown lands belonging to the Saguenay Port Authority. This site was designated as an industrial-port site by the Government of Quebec in 2015 under its Mining Strategy[6] developed complementary to the Plan Nord.[7] Controlled access to the site is planned from a private road connected to Chemin du Quai-Marcel-Dionne. In the marine environment, the Project infrastructure would be situated within the area of jurisdiction of the Saguenay Port Authority established under the *Canada Marine Act*. Several First Nations assert rights to the territory concerned by the Project (see Chapter 7 of this report).

The site of the Project infrastructure mainly overlaps agriculture, forestry and industrial land uses to the south. The Saguenay River is north of the site on which the Project infrastructure would be located. On the River's south shore are private recreational land and existing port facilities.

2.2 Project Factors

2.2.1 Project Components

The Project would include process facilities to liquefy and store the liquefied natural gas and a marine infrastructure for berthing tankers and loading and transportation of liquefied natural gas.

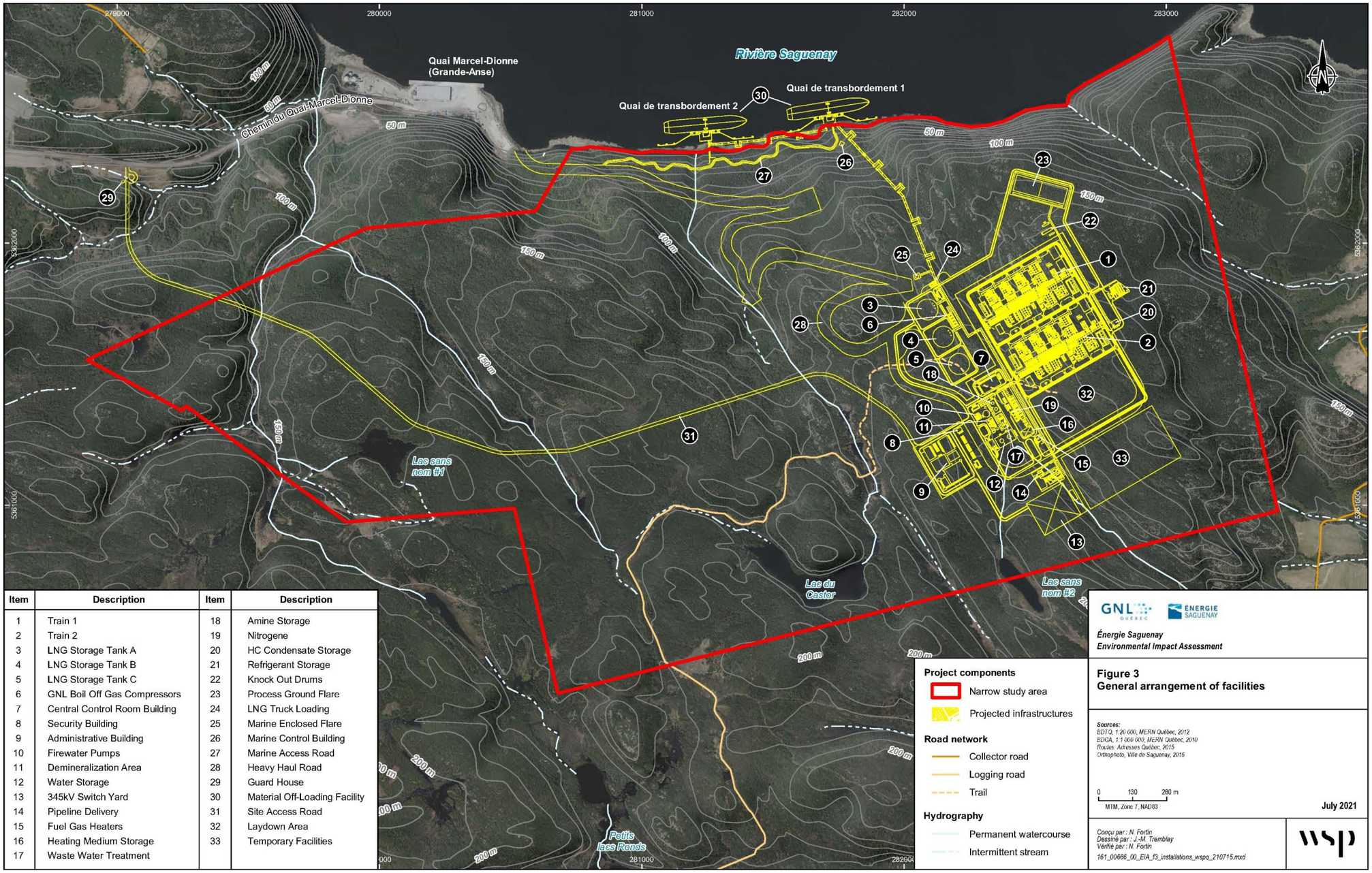
The natural gas would come from Western Canada and would be sent via existing gas pipelines and a new gas pipeline, 750 kilometres long, which would be constructed by Gazoduc Inc. The complex would be supplied with power by a 345-kilovolt transmission line approximately 40 kilometres long, which would be constructed and operated by Hydro-Québec between the Saguenay substation and the complex. However, these activities are not under the responsibility of the Proponent and are not part of the designated project assessed.

[6] https://strategiemaritime.gouv.qc.ca/
[7] https://plannord.gouv.qc.ca/fr/

The marine transportation of liquefied natural gas will be performed by companies specialized in the field. The tankers will transit the St. Lawrence River and the Saguenay River. It is projected that the tankers will make between 150 and 200 trips per year, carrying three to four shiploads of liquefied natural gas per week (six to eight trips by vessels per week).

The Project's main components are illustrated in Figures 3 and 4 and a summary description of the Project is presented in Table 3.

Figure 3: Main Components of the Énergie Saguenay Project



Item	Description	Item	Description
1	Train 1	18	Amine Storage
2	Train 2	19	Nitrogene
3	LNG Storage Tank A	20	HC Condensate Storage
4	LNG Storage Tank B	21	Refrigerant Storage
5	LNG Storage Tank C	22	Knock Out Drums
6	GNL Boil Off Gas Compressors	23	Process Ground Flare
7	Central Control Room Building	24	LNG Truck Loading
8	Security Building	25	Marine Enclosed Flare
9	Administrative Building	26	Marine Control Building
10	Firewater Pumps	27	Marine Access Road
11	Demineralization Area	28	Heavy Haul Road
12	Water Storage	29	Guard House
13	345kV Switch Yard	30	Material Off-Loading Facility
14	Pipeline Delivery	31	Site Access Road
15	Fuel Gas Heaters	32	Laydown Area
16	Heating Medium Storage	33	Temporary Facilities
17	Waste Water Treatment		

Source: WSP, July 2021

Figure 4: 3D Visual Presentation of the Liquefaction Facilities

Source: WSP, May 2019

Table 3: Summary Description of the Project Components

Components	Description
Liquefaction Complex	
Liquefaction unit (2)	• Equipped with a refrigeration system and an air-cooling system in each unit.
Natural gas processing equipment	• Elimination or reduction to an acceptable level of impurity and undesirable trace elements.
Total integrity tank (3)	• Liquefied natural gas storage; • Individual capacity of approximately 200,000 cubic metres for a maximum storage capacity on the site of 600,000 cubic metres; • Allows liquid content and vapours; • Outer envelope of reinforced concrete approximately one metre thick, constructed around the specialized steel tank.
Refrigerant tank (7)	• Individual capacity of less than 700 cubic metres; • Three propane tanks, two ethylene tanks and two liquid nitrogen tanks.
Other systems	• Evaporation gas management system; • Natural gas supply and compression station; • Process flare stake on land and marine flare stack; • Utility systems for production of demineralized water, nitrogen and compressed air; • A reheating unit for process heating needs;
Marine Infrastructures	
Loading platform (2)	• 46 metres side and 35 metres deep; • Mainly supporting the liquefied natural gas loading arms, the pipes, a turret with its catwalk to access the ships, firefighting equipment and lighting systems; • Constructed of reinforced concrete and supported by vertical steel piles encased in the rock.
Dolphins (20)	• Allows berthing and mooring of the tankers; • Four dolphins for berthing (9 metres by 9 metres) and six dolphins for mooring (5.5 metres by 5.5 metres) per loading platform.
Catwalk (2)	• Allows access to the dolphins from the platforms and connects the dolphins to each other; • Approximately 1.2 metres wide and made of steel; • Vertically and horizontally supported by the dolphins.
Loading arms	• Four loading arms, i.e., two arms for loading liquefied natural gas, one arm for vapour return and one hybrid arm that will be used for either need, but which will also act as a back-up arm in case one of the other arms fails.

Components	Description
Infrastructure and Support Facilities	
Supply of drinking water and process water	• Supplied by Ville de Saguenay; • Supply of drinking water for human consumption and the sanitary facilities of 300 employees, a need of 1.3 cubic metres per hour; • Production of demineralized water for the end of the process, for a required volume of 27.5 cubic metres per hour.
Wastewater management	• Release of demineralized water, a flow of 13.75 cubic metres per hour; • Reuse of a portion of the water as washwater and fire tests; • Monitoring of the quality of the water released; • Management of sanitary water by an autonomous treatment unit or a treatment site that will be constructed and operated by the Saguenay Port Authority or by Ville de Saguenay.
Site access road	• Asphalt road approximately four kilometres long, which will connect to Chemin du Quai-Marcel-Dionne; • Access road to the marine infrastructure and access road for construction and operation; • Security station to ensure control of entrances and exits on the site.
Truck loading area	• Loading of liquefied natural gas trucks on the site (no potential customer for now).

Concerning the presence of two wharves, the Proponent presents its analysis in the environmental impact statement and explains that: “two loading platforms would be the best option in terms of safety and operational flexibility, particularly when the transit times of the ships can be influenced by the seasonal conditions (ice, winds, fog, etc.) or other factors. Having a second berth will allow a tanker to arrive and wait in total safety at a platform while another liquefied natural gas tanker ends its loading and then leaves the other platform. Only one ship will be loaded at a time.” (WSP, January 2019).

2.2.2 Project-Related Activities

The activities necessary for the development of the Project are described in Table 4 according to the phases of its lifecycle. The Proponent plans for the complex to remain in use as long as it is safe, productive and profitable and estimates that the lifecycle of its facilities is 25 to 50 years.

At the end of its lifecycle, the liquefaction complex would be closed according to the legislation and regulations in force. However, unless the Saguenay Port Authority gives notice to the contrary, the loading platforms and the access roads would be conserved for subsequent use by other customers or tenants of the port industrial zone managed by the Saguenay Port Authority.

Table 4: Description of the Project's Activities by Development Phase

Activities	Description
Construction Phase (57 months)	
Site preparation (2022)	• Construction of access roads, including the access highway to the liquefaction complex 12 metres wide, including three watercourse crossings, and the access road to the marine infrastructure, eight metres wide, one watercourse crossing. • Construction of a road for delivery of equipment parts between the Port of Grande-Anse and the complex, 40 metres wide[8], including two watercourse crossings. • Installation of fences, barriers and signage tools; • 111 hectares of deforestation work; • Blasting, stripping, excavation and backfilling, drilling, development of culverts and drainage ditches, soil compaction, grading and site cleanup; • Reuse of the excavated soils according to their technical quality; • Deployment of a peripheral surface water drainage system for the construction period; • Development of different permanent work areas necessitating encroachment on the freshwater habitat of a 680-metre section of watercourse CE-03 of the outlet of nameless lake No. 2; • Relocation of watercourse CE-03.
Installation of temporary infrastructures (2022–2023)	• Installation of temporary construction areas provided to accommodate the site trailers, parking areas, sanitary facilities, temporary electrical infrastructure, containers for storage of materials and equipment, and waste containers.

Construction work (2023–2026)	• Concreting work[9] because the buildings and facilities will be supported on concrete foundations;
	• Structural, pipefitting, mechanical and electrical work;
	• Planning and construction of marine infrastructure:
	  ○ Pile vibro-sinking;
	  ○ Pouring concrete bases to encase the piles;
	  ○ Deployment of prefabricated loading platform aprons with a crane barge;
	  ○ Deployment of preassembled steel structures (handrails, ladders, catwalks);
	  ○ Installation of equipment, such as capstans and fenders, preassembled on land, with crane barges;
	  ○ Sacrificial anode cathodic protection required, installed via divers;
	• Architectural work, because the buildings and certain facilities will have architectural envelopes to isolate them, protect them against bad weather and render them operational.

[8] Following the construction phase, the road right of way would be reduced and a lane ten metres wide would be asphalted. The excess portions of the road right of way would be revegetated.

[9] The concrete would be prepared off-site. It would be transported by concrete mixers to the site and then poured directly into the formwork.

Deployment of mitigation measures (2022–2026)	• Construction site water management via a network of ditches; • Air emission management; • Noise level management; • Management of residual construction materials through various containers and their segregation; • Management of petroleum products; • Equipment management; • Traffic management; • Response after a spill or another emergency.
Site closure and cleanup (2026)	• Cleanup of the entire site and rehabilitation, primarily the cleaning area of the concrete mixers, the storage areas and the trailer areas.
Operational Phase (25 to 50 years)	
Operation	• Commissioning of liquefaction unit 1 in 2026 liquefaction unit 2 in 2026–2027; • Presence and use of building and permanent facilities; • Lighting of nocturnal operations on the site; • Worker traffic; • Air emission management; • Industrial noise management; • Wastewater and rainwater management.

Navigation and loading	• Liquefied natural gas tankers during berthing approach and in motion:
	  ○ Bigger ships possible with a capacity of 217,000 cubic metres;
	  ○ Capacity of expected tankers between 160,000 and 180,000 cubic metres;
	  ○ Dimensions ranging between 290 metres and 300 metres long and approximately 45 metres to 50 metres side, for a draught of approximately 12 metres;
	  ○ Double-hulled;
	  ○ Three to four tankers per week, or 150 to 200 tankers per year (maximum operating scenario).
	• Loading:
	  ○ Three pumps used in each tank;
	  ○ Two tanks used at the same time for loading;
	  ○ Pumping capacity of each pump 2,000 cubic metres per hour;
	  ○ 13 to 15 hours of loading for a tanker with a capacity between 160,000 and 180,000 cubic metres.

Housekeeping in maintenance	• Presence and use of buildings and permanent facilities; • Use, storage and management of non-hazardous residual materials (recovery, recycling, etc.); • Use, storage and management of hazardous materials (disposal).
Arrival of natural gas	• The natural gas will be delivered to the liquefaction facilities by a new gas pipeline 106.7 centimetres (42 inches) in diameter and will conform to gas industry standards, i.e., 95% typical mean methane. • The natural gas will pass through a metering and pressure control station, before its treatment.

Liquefaction process	• Treatment of natural gas to eliminate or reduce to an acceptable level the impurities or trace elements that are undesirable or incompatible with the liquefaction process; • Liquefaction of natural gas, i.e., cooling through refrigeration circuits to temperature of approximately -162 degrees Celcius
Closure Phase (12 months)	
Dismantling activities	• Site mobilization and demobilization; • Dismantling of the facilities in the terrestrial environment; • Machinery traffic, transport of dismantled equipment and transportation of workers; • Excavation, backfilling, grading and stabilization of land as needed; • Management of non-hazardous and hazardous residual materials.
Site closure and cleanup	• Cleanup and rehabilitation of the dismantling sites and the job sites at the end of the training work.

3. Project Justification and Alternatives Considered

The information gathered on the background, justification and alternatives is used to inform the Minister of Environment and Climate Change and support his decision-making when considering the Agency's recommendations on the significance of the environmental effects of the Project.

3.1 Project Background and Rationale

The main objective of the Project is to process, liquefy and transport Canadian natural gas to world markets by tanker. The Proponent argues that the economic interest of the Project stems from the significant changes in the North American natural gas market over the last ten years. These changes have resulted in market saturation on the North American continent, a lack of competitiveness of natural gas from Western Canada with customers in Eastern Canada, and a decrease in exports to the United States, resulting in a situation of surplus production. On the other hand, the Proponent maintains that global demand for natural gas is growing strongly and is likely to continue, due in particular to the replacement of more polluting fossil fuels (coal and oil), economic growth in emerging countries and the reduction in the use of nuclear energy in some countries. These factors explain the Proponent’s economic interest in exporting Canadian-produced natural gas to world markets.

The Proponent, drawing on the International Energy Agency's 2017 report, argues in its Impact Statement that the use of natural gas as an energy source allows for fewer air contaminants emissions than traditional fossil fuels (oil and coal), which is a major issue in certain regions of the world. Natural gas would complement intermittent renewable energies, such as wind and solar photovoltaic energy, to enable a sustainable transformation of energy systems. Natural gas would also help to meet needs where alternative energies cannot play a role, for example for heat generation and powering industrial processes. Finally, it makes it possible to provide competitively priced electricity in developing countries where access to electricity is not yet guaranteed for everyone. Indeed, the Proponent argues that, according to a 2019 International Energy Agency report, countries that are more sensitive to rising electricity prices would tend to turn first to natural gas to meet their needs.

Lastly, the Proponent argues that the establishment of the complex in Quebec would bring several competitive advantages over other complexes of the same type. It would be the first natural gas liquefaction plant in the world to be powered by hydroelectricity, which would reduce its greenhouse gas emissions. In addition, the Proponent mentions that the cold climate of the Saguenay would allow for a 15% gain in efficiency of the liquefaction process.

The Innu First Nations of the Essipiunnuat, the Pekuakamiulnuatsh and the Pessamiulnutsh publicly opposed the Project in May 2021. The Innu First Nations base their opposition on the BAPE review report published in March 2021 and stating that there are uncertainties surrounding the effects of the Project on marine mammals as well as in terms of energy transition. On this subject, the Innu First Nations have publicly expressed their concerns regarding the purpose of the Project and the real substitution role that the exported natural gas could play.

The public also expressed several concerns about the purpose of the Project. Many are concerned that the Project will favour a polluting industry in a context of global climate change. The public also contests the idea that the Project would replace more polluting energies. Many are concerned that the Proponent does not offer real alternatives to support the transition to a green economy. The section 5.1 of this report elaborate on these points.

In response to the concerns received, the Agency questioned the Proponent in its first request for information so that the description of the context of integration and the purpose of the Project would make it possible to target environmental, social and economic issues at the local and regional levels, as well as at the national and international levels. In particular, it asked the company to explain how its Project would enable the replacement of more polluting energy sources such as coal. The Proponent provided references to justify its Project as part of its responses to the Agency's request for information. Its responses have been taken into account in this analysis.

Agency Analysis and Conclusion

The Agency has reviewed the information provided in the various documents submitted and considers that the Proponent has justified the rationale for its natural gas liquefaction complex Project satisfactorily for the purposes of the environmental assessment.

3.2 Alternatives for Project Delivery

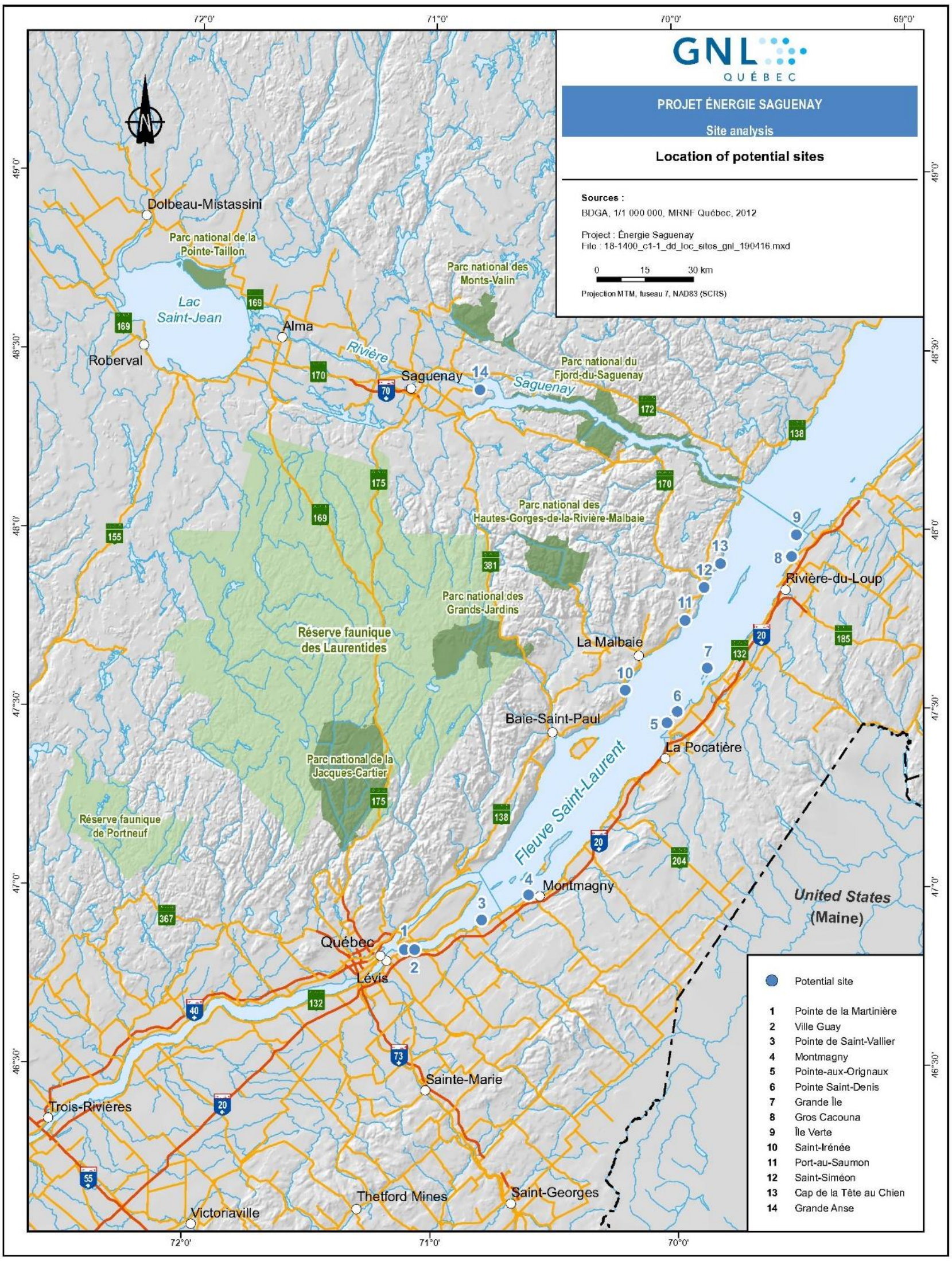
In the Environmental Impact Statement, the Proponent identifies alternatives to the Project that are technically and economically feasible. The Proponent describes the general environmental effects associated with each option and justifies the choice of the selected option. Alternatives were considered for the following Project components: site location and marine infrastructure, liquefaction process, compressors, liquefied natural gas storage, flare type, infrastructure layout, liquefied natural gas transportation and tanker loading.

Site Location

The Proponent evaluated 14 potential sites (Figure 5), using the following criteria: obstructions resulting from a law or regulation preventing industrial construction, major heritage value, major ecological value or land use. The Proponent has presented a description of these sites and the advantages and disadvantages of each[10]. Of these sites, 11 were rejected because they had major obstructions related to one of the criteria listed above. The list was thus reduced to three sites for which a comparative analysis of variants was conducted (Table 5). It should be noted that the three pre-selected sites were also targeted by the provincial government in the 1970s in its prospective analyses to identify Quebec's potential to receive liquefied natural gas-related industries.

[10] Information and clarification requested by the CEAA for concordance with the April 2019 Environmental Impact Statement (WSP, April 2019)

Figure 5: Location of terminal location variants



Source: WSP, July 2021

Table 5: Site selection variants

Evaluated site	Proponent description and rationale
Ville Guay (former Rabaska Project)	• On the south shore of the St. Lawrence River; • Large and relatively flat land available; • This would require the construction of a jetty of approximately 500 metres, at the end of which the loading platform would be installed; • A little more than one kilometre upstream from the hydroelectric pylons connecting the south shore to Île d'Orléans; • Site outside critical beluga whale habitat, but ship traffic inside; • Agro-industrial zone with low residential and resort density.
Gros Cacouna (former Énergie Cacouna Project)	• On previously disturbed land currently classified for industrial use; • Construction of a jetty of approximately 400 metres to accommodate the loading dock in an Important Bird Area (IBA); • Site located within critical beluga whale habitat.
Grande-Anse ***Variant selected***	• On the south shore of the Saguenay River; • Far from inhabited areas, despite its proximity to the city of Saguenay; • Binding visual impact for residents and boaters in the area; • Restricted area assigned to industrial and/or port development; • Waters with a natural depth of 10 to 15 metres would not require dredging; • Availability of the related infrastructure required for the Project (port, railways, drinking and waste water, etc.) and secure supply of competitively priced electricity; • Site outside critical beluga whale habitat, but ship traffic inside.

The Grande-Anse site was selected by the Proponent since, according to its analysis, it presented the most favourable conditions for the establishment of its facilities. Moreover, the Government of Quebec announced on June 6, 2016, that it wished to promote the establishment of an industrial-port zone in Saguenay, around the Grande-Anse marine terminal. This initiative is part of the Government of Quebec's Marine Strategy, which provides for the development of industrial port areas in Quebec, notably by financially supporting private investment projects in these areas through an envelope provided for in the[11] Fonds du développement économique.

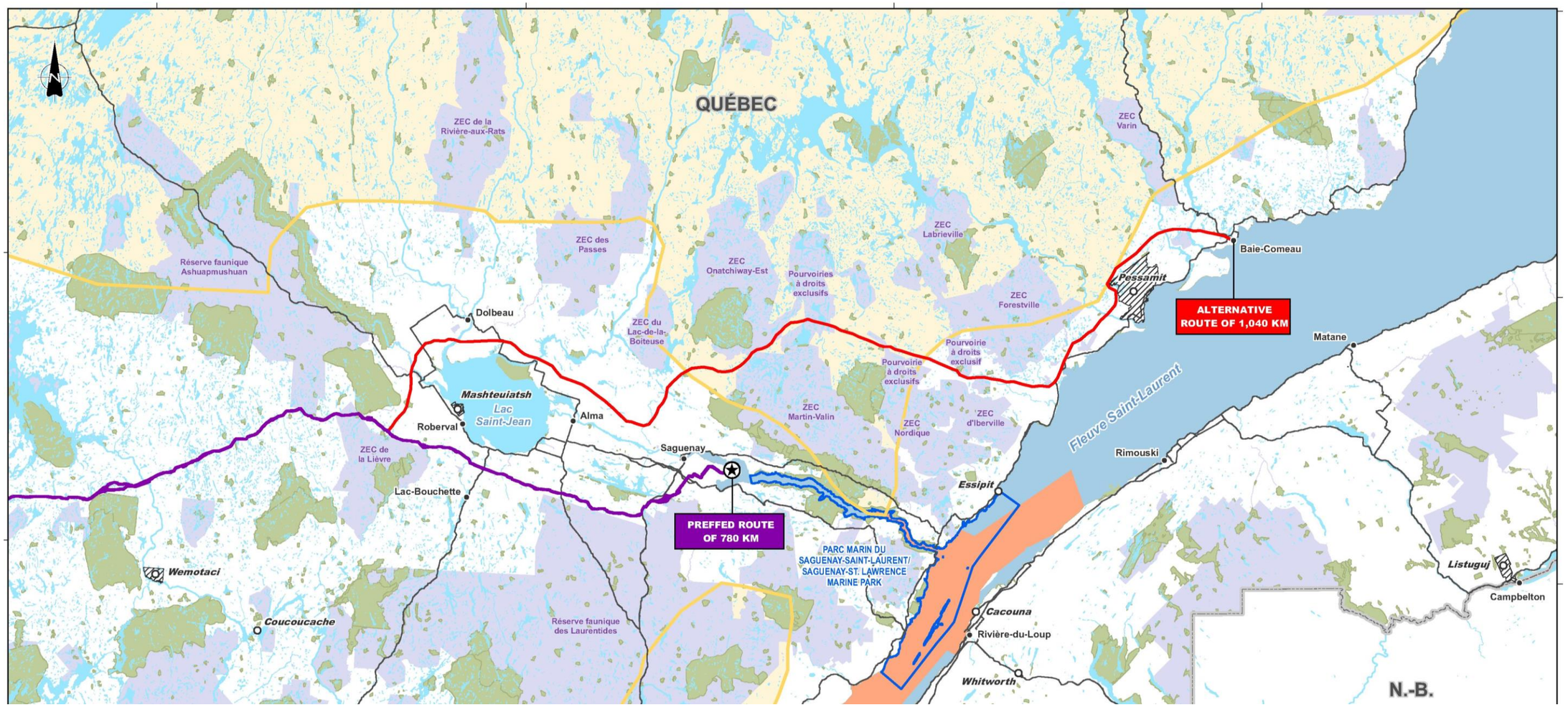
The site selection led to several questions being submitted to the Agency because the proposal in the Proponent's impact statement does not meet the requirement of paragraph 73(3)(a) of the *Species at Risk Act* (SARA), namely that all alternatives likely to minimize the negative consequences of the activity for the species, in this case the beluga whale, be considered and the best solution selected, since the 14 proposed sites do not make it possible to avoid shipping traffic in the beluga whale's critical habitat. This is discussed in section 5.2 of this report. The public also contests the selection of the Project site, which would cross the Saguenay-St. Lawrence Marine Park and the beluga whale's critical habitat. In

[11] https://strategiemaritime.gouv.qc.ca/grandes-orientations/economie/!/developper-des-zones-industrialo-portuaires-afin-dameliorer-la-competitivite-de-nos-entreprises/

particular, the public was concerned about the potential consequences of ship traffic and accidents and malfunctions (see also sections 5.2 and 6.1 of this report).

Questioned on this subject in the Agency's first request for information, the Proponent presented an additional site located in Baie-Comeau (Figure 6). In its analysis, the Proponent replied that “if no site was selected downstream from the Saguenay River (outside the critical beluga whale habitat), it is because no site presented a viable situation for the Project”. He added that the construction of a liquefaction plant on the North Shore, which would not be located in critical beluga whale habitat, “is not economically viable due to significant environmental and technical constraints”. In its response, the Proponent explains that the potential route of a gas pipeline to Baie-Comeau to transport the gas should, among other things, avoid crossing the Saguenay Fjord as well as controlled harvesting zones increasing the route by about 260 kilometres (representing an additional investment of approximately $1.5 to $2 billion). The route would also cross the habitat of the woodland caribou, a species at risk. In addition, the Proponent mentions the lack of adequate and accessible industrial land (i.e., near the banks) downstream from the Saguenay River and the lack of access to redundant hydroelectricity sources (a necessary element to ensure the safety of operations). The Proponent therefore concluded that a gas pipeline extending north of the Saguenay Fjord and the establishment of a plant downstream from the Saguenay would result in a major cost increase, making the Project unprofitable as a whole, and would raise significant environmental issues.

Figure 6: Additional route considered by the Proponent in response to the first information request



Source: WSP, July 2021

Marine Infrastructure

The Proponent evaluated two location options for marine infrastructure on the south shore of the Saguenay River, namely the Grande-Anse site and the Anse-à-la-Puce site. The Proponent chose the Anse-à-la-Puce site because it has a less abrupt topography and requires a shorter cryogenic pipe, in addition to providing more manoeuvring space for tankers. As it is farther away from the Grande-Anse terminal, this location would limit the impact on port activities.

Concerns were raised by the public that the Proponent might have favoured technical and economic criteria in choosing the location of marine infrastructure to the detriment of environmental and social criteria, particularly since the Anse-à-la-Puce site would be a diving site. The Proponent responded to these concerns in its answers to the Agency's first request for information by indicating that it intends to disclose in advance the schedule of tanker traffic. It added that, according to section 27 of the Port Authority Operations Regulations, persons diving in the area must have an authorization from the Port of Saguenay. He also stated that the port has no applications on file and that, if it did, they would likely be rejected because of the dangerousness of the area.

The Proponent also evaluated four potential options for the wharves: concrete caissons, steel cell (sheet piling), anchored or on piles steel cell facilities. The variant of the platform on piles was selected by the Proponent. Although construction costs are higher for this type of facility, it explains that it is still more advantageous than the two types of steel cell platforms in terms of maintenance. In addition, the wharf on piles would have the advantage of not modifying the hydrosedimentary dynamics of the sector. During the construction of this type of facility, the piles are driven into the rock by vibro-drilling and can be wrapped in a curtain of bubbles to limit the propagation of underwater noise. No dredging or blasting is required for this type of structure and the footprint is smaller than for other types of wharves, thus limiting the effects on fauna and flora.

Liquefaction Process

The Proponent evaluated two liquefaction process options, Air Product and Chemical Inc.'s Propane Pre-Cooled Mixed Refrigerant (C3MR) and Conoco Phillips' Optimized Cascade®. The C3MR variant was selected because it is better known and most frequently used worldwide. It also has high thermodynamic efficiency, whereas the Optimized Cascade process requires more equipment and compressors, increasing the potential for fugitive greenhouse gas emissions.

Compressors

The Proponent evaluated two compressor options, natural gas-fired and electric-powered turbines. The Proponent selected the electric-powered turbine variant, since it does not emit greenhouse gas, is less expensive and requires less maintenance.

Liquefied Natural Gas Storage

The Proponent evaluated three storage tank options: single integrity, full integrity and membrane. Membrane tanks have the advantage of being smaller compared to other tanks (no insulation layer required) and having better resistance in the event of an earthquake. However, their cost is higher and no large capacity membrane tanks have been built in North America due to the lack of expertise with this type of tank. The Proponent therefore chose the full integrity tank, which is more common and has an excellent safety record. The Proponent therefore considers this type of tank to be the best available and safest technology for its Project.

Type of Flare

The Proponent evaluated three flare system options, namely elevated flare, ground flare and confined flare.

All three flaring systems have emissions of a similar nature, with CO_2 as the main emission. However, elevated flaring has 1,000 tonnes less of CO_{2eq} emissions per year than the other two types of flares. The Proponent chose ground flaring for hot and cold process vapours and confined flaring for marine flaring. Both ground and confined flares have minimal thermal radiation, allowing them to be positioned close to process facilities, thus limiting the total footprint. Light emissions are also greatly reduced. Thus, the visual effect is significantly reduced for the surrounding communities. In addition, they are less noisy than elevated flares when in use. Finally, this type of facility induces lower potential effects for migratory birds. Minimizing the effects on the visual aspect and on wildlife therefore supported the Proponent's final decision to opt for ground and confined flares.

Other Variants Requested in the Guidelines

With respect to the selection of infrastructure layout, the Proponent explains that it has located the complex in an area where environmental impacts would be minimized, while maintaining technical and economic feasibility. The complex was positioned to the east of the industrial-port zone in order to limit impacts on the more numerous wetlands and waterways to the west. It would make it possible to limit the volume of cut and fill and earthworks. The complex could be integrated into the natural topography of the site.

In addition, the Proponent explained the reasons why it did not provide a variance analysis for some potential activities identified in the Guidelines, which are summarized below.

- **Approach channel**: the Proponent states that the Saguenay River does not include any channel given its significant depth.
- **Anchorage zones**: the Proponent states that the low traffic anticipated at the transshipment platforms would make anchoring occasionally necessary. When anchoring would be required, tanker pilots would determine the location of these zones themselves given the great depth of water available.
- **Liquefied natural gas transportation and tanker loading**: The Proponent states that due to the export of liquefied natural gas to markets in Europe, Asia, the Middle East and South America, shipping by tanker is the only option. Furthermore, the Proponent states that "the loading of tankers is based on a

combination of proven technologies ranging from special loading arms to dedicated tankers. There are few or no alternatives."

- **Dredging methods and management of sediments and their disposal sites**: the Proponent states that no dredging is required for this Project.

Agency Analysis and Conclusion

The Agency reviewed the Proponent's evaluation of alternatives and its responses to the Agency's questions and concerns raised by the public and Indigenous communities. For the various key components of the Project, the Proponent identified technically and economically feasible alternatives and identified environmental effects. The Proponent's selections took into account several environmental, social and economic aspects. The Agency is satisfied with the Proponent's responses and is of the opinion that the Proponent has sufficiently assessed the feasible alternatives for the Project for the purpose of assessing the environmental effects of the Project under the *Canadian Environmental Assessment Act (2012)*.

4. Consultation Activities and Advice Received

The Agency prepared this draft environmental assessment report taking into consideration comments from the public, Indigenous peoples and government experts. Local knowledge about the Project location was also considered in determining the potential environmental effects of the Project. The Agency, in collaboration with the federal environmental assessment committee, conducted consultation activities with the public and Indigenous peoples at key stages of the process. These activities were announced on the Canadian Environmental Assessment Registry[12] and included the following documents:

- The Project description (from December 3 to December 23, 2015);
- Draft Guidelines for the Preparation of an Environmental Impact Statement by the Proponent (January 15 to February 15, 2016);
- The Proponent's Environmental Impact Statement (May 17 to June 17, 2019).

Consultation with First Nations has also been ongoing throughout the environmental assessment process and will continue until a decision is made. In this fourth and final comment period, the Agency is seeking comments on this draft report, the conclusions and recommendations contained therein, and potential conditions to support the Minister's decision statement. After considering comments from the public, Indigenous peoples and government experts on this draft report, the Agency will finalize the environmental assessment report and submit it to the federal Minister of Environment and Climate Change for his decision under CEAA 2012.

4.1 Crown Consultation

4.1.1 Crown Consultation Conducted by the Agency

The federal government has a duty to consult and, where appropriate, accommodate Indigenous peoples when contemplating decisions that may adversely affect potential or established Aboriginal and treaty rights protected by section 35 of the *Constitution Act, 1982.* Consultation with Indigenous peoples is also conducted in a comprehensive manner as an important element of good governance and informed policy development and 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 and perspectives they bring to the process.

For the purposes of environmental assessment, the Agency acts as the Crown Consultation Coordinator to facilitate a whole-of-government approach. First Nations that have been invited to participate in consultations

[12] https://iaac-aeic.gc.ca/050/evaluations/proj/80115

include those with established or potential Aboriginal or treaty rights that may be adversely affected by the Project. These include the following First Nations:

- Essipiunnuat (Essipit) First Nation;
- Pekuakamiulnuatsh (Mashteuiatsh) First Nation;
- Pessamiulnutsh (Pessamit) First Nation;
- Huron-Wendat Nation;
- Wolastoqiyik Wahsipekuk (Maliseet) First Nation

The Agency consulted with First Nations in an integrated manner in the environmental assessment process. It provided opportunities for First Nations to communicate their concerns and comments on the Project through telephone calls, e-mails, letters and in-person meetings. Regular updates were provided to keep First Nations informed of significant developments in the EA process and to seek their input. In addition, First Nations were invited to participate in public consultations. Several of the 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 or to raise concerns or questions regarding impact mitigation measures. The First Nations are now invited to comment on the draft version of this environmental assessment report.

Through its Participant Funding Program, the Agency administers funds to support the participation of Indigenous communities in the environmental assessment process. A total amount of $143,897.74 has thus been allocated to support the eligible activities of the First Nations that participated in the assessment. Details of the amounts by Indigenous people can be found in Table 6. The Participant Funding Program for the environmental assessment of the Project was available to all First Nations potentially affected by the Project.

Table 6: Funds allocated to First Nations by the Financial Assistance Program

Beneficiary	Amount allocated
Essipiunnuat First Nation	$34,175.00
Pekuakamiulnuatsh First Nation	$24,381.38
Pessamiulnutsh First Nation	$31,188.00
Huron-Wendat Nation	$54,153.36
Total	**$143,897.74**

The Agency presented the First Nations concerned with consultation plans detailing the proposed consultation activities at the various phases of the environmental assessment and carried out activities based on the needs expressed. Table 7 summarizes the main participation opportunities that were offered to the First Nations.

Table 7: Main participation opportunities offered by the Agency to the First Nations

Period and communities consulted	Consultation activities
December 3 to 23, 2015	• Electronic consultation on the Proponent's Project description via the Canadian Impact Assessment Registry
January 15 to February 15, 2016	• Electronic consultation on the Draft Guidelines for the Preparation of an Environmental Impact Statement by the Proponent via the Canadian Impact Assessment Registry
May 17 to June 17, 2019	• Electronic consultation on the Proponent's Environmental Impact Statement via the Canadian Impact Assessment Registry
July 10, 2019 (Innu First Nations)	• Technical meeting on the Impact Statement between the Innu First Nations, the Agency, the federal committee and the Proponent, in Essipit
July 11, 2019 (Innu First Nations)	• Meeting between the Agency and the Innu First Nations in Essipit
2019 - June 2021	• Information requests to the Proponent: integration of First Nations' issues and sharing of the Proponent's answers • Meetings and exchanges with First Nations for updates on the Project, the treatment of their issues and on the environmental assessment schedule • Discussions with First Nations regarding rights impact assessments and key mitigation measures • Share final advice from expert departments and propose meeting
June 29, 2021 (Innu First Nations and Wolastoqiyik Wahsipekuk)	• Meeting with expert departments to present their final opinions on the Project: Transport Canada, Fisheries and Oceans Canada, Parks Canada, Environment and Climate Change Canada

Wolastoqiyik Wahsipekuk First Nation has been included in the consultation from 2020 due to changes in the scope of the environmental assessment and the First Nation's request to participate in the process.

The Agency will be offering additional meetings with First Nations to discuss this draft report and to gather their comments and concerns.

The main concerns raised during the consultations were the following:

- Marine transport and beluga whales (navigational control, ship noise, ballast water monitoring);
- Cumulative effects of the various projects along the Saguenay River;
- The potential effects of an oil spill;
- Greenhouse gases;

- Socioeconomic effects, notably the effect of navigation on recreational-tourism activities such as marine mammal watching and sea urchin fishing practised by the First Nations of the Essipiunnuat Innu, Pekuakamiulnuatsh and Innu of Pessamiulnutsh at the mouth of the Saguenay River;
- The repercussions of the Project on the rights of the communities;
- Involvement of Indigenous communities in archaeological inventory work.

Appendix D summarizes the concerns raised during the Crown's consultations with Indigenous groups.

4.1.2 Engagement Activities of Indigenous Peoples Organized by the Proponent

The Proponent's assessment of the potential effects of the Project and the information it obtained regarding current uses of lands and resources for traditional purposes and impacts on Aboriginal and treaty rights informed the federal government's consultation exercise. The main consultations and mobilization activities organized by the Proponent included:

- Meetings of the follow-up committee in place since November 2014 and the environment sub-committee, composed of representatives of the Proponent and the First Nations of the Essipiunnuat Innu, Pekuakamiulnuatsh and Innu of Pessamiulnutsh;
- Meetings with the Huron-Wendat Nation to present the status of the Project and discuss their concerns and a potential collaborative agreement including a complementary impact study conducted by the First Nation;
- Meetings of the Regional Advisory Committee, in which Innu First Nations participate as observers;
- A workshop on November 12 and 13, 2019, to discuss the responses prepared on the aspects of the Agency's first request for information affecting Innu First Nations;
- A meeting with the Wolastoqiyik Wahsipekuk First Nation on December 3, 2020, to provide an update on the Project and potential First Nation issues.

4.2 Public Consultation

4.2.1 Public Consultation Conducted by the Agency

The Agency provided the public with three opportunities to participate in the environmental assessment process by submitting comments and concerns directly or through the Canadian Impact Assessment Registry on the Project description, the draft environmental impact statement guidelines and the Proponent's environmental impact statement summary. The Agency also considered comments received throughout the assessment process. Individuals and groups who expressed an interest in the Project were informed directly by e-mail or telephone call of consultation opportunities.

In addition, as part of the consultation on the Proponent's environmental impact statement summary, an open house session (theme booths) was held in the municipality of Saguenay, Chicoutimi borough, on June 11, 2019. Approximately 42 participants had the opportunity to learn more about the environmental assessment process and to discuss directly with representatives of the Agency and attending federal departments (see section 4.3) about their concerns regarding the potential environmental effects of the Project and the applicable regulatory framework. The Proponent was also present. Two interactive activities were offered to participants to enable them to identify the issues or concerns that were most important to them. Alternatively, the public had the opportunity to send their comments through e-mails or letters.

Greenhouse gas emissions, the origin of the natural gas and the extraction methods, the impact of marine transportation and the cumulative effects of its increase on aquatic fauna, particularly beluga whales, and the decrease in the high natural value of the Fjord were the issues that generated the most comments.

The Agency supported public participation in environmental assessment through its Participant Funding Program. A total of $73,245.70 was allocated to the organizations listed in Table 8 to participate in the assessment process. In addition, several other citizen groups or organizations also submitted comments that are available on the Canadian Impact Assessment Registry.

Table 8: Funds allocated to the public through the Financial Assistance Program

Beneficiary	Amount awarded
Owners' Association of l'Anse à Pelletier	$12, 300.00
Saguenay-Charlevoix ZIP Committee	$7,336.00
Conseil régional de l'environnement et du développement durable du Saguenay-Lac-Saint-Jean	$8,569.00
Emergency Water! The Quebec Coalition for Responsible Water Management	$11,505.00
EURÊKO!	$10,503.92
Nature Québec	$12,300.00
Organisme de bassin versant du Saguenay	$10,731.78
Total	**$73,245.70**

Details of concerns and comments raised in relation to the Project, predicted effects on valued components and changes to the environment are listed in sections 3, 5 and 6.

4.2.2 Public Participation Activities Organized by the Proponent

From the launch of the Project in the summer of 2014 until June 2015, the Proponent held some fifty meetings with various stakeholders, including government authorities and their local representatives (elected officials and public servants), local and regional economic, environmental and recreational tourism stakeholders, educational institutions and residents near the Port of Saguenay.

The Proponent also established a Natural Gas Liquefaction Complex Advisory Committee early in the development of the Project to discuss issues and concerns associated with the Project. The committee is made up of 20 representatives of municipalities, citizens, First Nations, tourism groups, environmental groups and social and economic groups.

A second committee dealing with marine shipping aspects was also set up. Since May 2018, a series of meetings have been held with socioeconomic stakeholders from various sectors interested in the issue of marine shipping and its impacts: tourism, municipalities bordering the Fjord, environmental groups, users of the Fjord as well as scientists and experts located in the Saguenay-Lac-Saint-Jean and North Shore areas.

The Proponent maintains that the consultations prior to its study made it possible to make certain changes to the initial Project, particularly with respect to the landscape integration of the liquefaction complex and marine shipping. The report on these activities was sent to the Agency as part of the Project[13] analysis.

Finally, the Proponent stated that it intends to continue its participatory approach for all phases of the Project, including monitoring and follow-up. An approach to this effect was presented in Chapter 5 of the impact statement.

4.3 Involvement of the Federal Government and Other Experts

Pursuant to section 20 of CEAA 2012, federal authorities with specialist or expert information or knowledge with respect to the Project provided advice to help determine if a federal environmental assessment is required. They participated in the drafting of the Environmental Impact Statement Guidelines, as well as in the analysis of the Proponent's Environmental Impact Statement and its responses to the Agency's requests for information. Depending on their area of expertise, federal authorities submitted comments and observations for the preparation of this draft report and potential conditions that will support the Minister's decision.

The following federal authorities provided input at each stage of the environmental assessment process by providing expertise and knowledge relevant to the Project:

- Fisheries and Oceans Canada, for fish and fish habitat, marine mammals, including assessment of the effects of underwater noise, aquatic species at risk, including beluga whales, regulatory decisions under the *Fisheries Act* and the *Species at Risk Act*;
- Environment and Climate Change Canada, for air quality, greenhouse gases, surface and groundwater quality, species at risk (other than fish and marine mammals), migratory birds, wetlands, soil quality, sediment quality, hydrology, accidents and malfunctions and emergency response plans, regulatory responsibilities under the *Canadian Environmental Protection Act, 1999, the Migratory Birds Convention Act, 1994,* the *Species at Risk Act,* and subsection 36(3) of the *Fisheries Act*;

[13] GNL QUÉBEC (July 2019). Complementary Consultation Report – GNL Québec's Énergie Saguenay Project - Summary of Consultations Held between June 18, 2018, 35 and June 18, 2019, 38 pages.

- Parks Canada, on marine mammals and fish and their habitat, particularly in relation to the potential effects of navigation in the Saguenay-St. Lawrence Marine Park, on archaeology, as well as regulatory and statutory responsibilities under the *Saguenay-St. Lawrence Marine Park Act*;
- Natural Resources Canada for geological characteristics, soil stability, geological and seismic hazards;
- Transport Canada, on the impacts of marine shipping, protection of navigation, berthing and departure of ships, ballast water management, marine incident prevention, and incident preparedness and response (environmental emergency), as well as regulatory and legal responsibilities under the *Canadian Navigable Waters Act* and the *Shipping Act, 2001*;
- The Laurentian Pilotage Authority and Canadian Coast Guard, on marine traffic and pilotage services in the St. Lawrence and Saguenay Rivers, as well as regulatory and legal responsibilities under the *Pilotage Act*;
- Health Canada, on the potential health risks of the Project due to changes in air quality, noise levels, contamination of country food and drinking water quality.

5. Predicted Effects on Valued Components

5.1 Transboundary Environmental effects – Greenhouse Gas Emissions

The Agency is of the opinion that the Project is likely to cause significant adverse transboundary direct and cumulative environmental effects due to the magnitude of its contribution to greenhouse gases and its impact on the achievement of the reduction targets of Quebec and Canada.

The greenhouse gas emissions produced upstream (production, treatment and transportation) are not considered to be part of the Project for environmental assessment purposes because this component escapes the Proponent's control and responsibility. Therefore, the Minister's decision under the CEAA 2012 will not establish whether the greenhouse gas emissions produced upstream are likely to result in significant adverse environmental effects. Consequently, these activities will not be subject to the conditions imposed on the Proponent by a Decision Statement authorizing the execution of the Project, in the event the Project can go ahead. However, they are presented and discussed in this section to inform decision-making. In addition, it should be noted that the potential international impact of substituting other energy sources with natural gas cannot be confirmed at this time and is beyond the scope of the environmental assessment of the Project.

5.1.1 Analysis of Potential Effects and Proposed Mitigation Measures

Description of the Component

Greenhouse gases are atmospheric gases that absorb and send back infrared radiation, causing warming of the lower layers of the atmosphere. They are recognized as one of the causes of climate changes that could have various effects on ecosystems and human health. The main greenhouse gas processes include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulphur hexafluorine (SF_6), ozone (O_3), hydrofluorocarbons (HFC) and perfluorinated hydrocarbons (PFC)[14]. These gases are dispersed worldwide and their emissions are considered under the terms of the CEAA 2012 as transboundary environmental effects.

Under the *Regulation respecting mandatory reporting of certain emissions of contaminants into the atmosphere*, the Government of Quebec collects data on greenhouse gases emitted by Quebec companies. Thus, any person operating an establishment that emits greenhouse gases into the atmosphere in a quantity

[14] The greenhouse gas estimates are usually expressed in kilotonnes of CO_2 equivalent per year. Emissions of methane (CH_4), nitrous oxide (N_2O), sulphur hexafluoride (SF_6), ozone (O_3), hydrofluorocarbons (HFC) and perfluorinated hydrocarbons (PFC) are calculated according to their equivalent in tonnes of carbon dioxide (CO_2) equivalent.

equal to or greater than 10 kilotonnes of CO_2 equivalent per year is required to report this establishment's emissions. At the federal level, the reporting threshold established under the *Canadian Environmental Protection Act (1999)* is 10 kilotonnes of CO_2 equivalent per year. All facilities exceeding this threshold are required to submit a report of their emissions to Environment and Climate Change Canada, according to the conditions set out in the Greenhouse Gas Reporting Program.

In 2018, total greenhouse gas emissions in Quebec were 80,600 kilotonnes of CO_2 equivalent. The sector that produced the most greenhouse gas emission was transportation (road, air, marine, rail and off-road), which generated 36,100 kilotonnes of CO_2 equivalent, for 44.8% of total emissions (MELCC, 2020). For Canada as a whole, total greenhouse gas emissions in 2018 were 729,300 kilotonnes of CO_2 equivalent (Environment and Climate Change Canada, 2020). The oil and gas operations and transportation sectors represent approximately 193,000 (26%) and 186,000 kilotonnes of CO_2 equivalent (25% of Canadian total emissions). Of the 1,706 Canadian facilities that reported emissions in 2018, about 11% emitted 250 or more kilotonnes of CO_2 equivalent.

Potential Effects

The greenhouse gases assessed by the Proponent for the construction and operational phases are primarily associated with the activities of the liquefaction complex and transportation, i.e., CO_2, CH_4, N_2O and black carbon[15].

The Innu First Nations shared concerns with the Agency regarding the Project's contribution to greenhouse gas emissions and the potential effects these could have on their uses in the long term. The Pessamiulnutsh First Nation is concerned about climate change, to which it indicates it is particularly vulnerable. The strategy the Proponent will adopt to achieve its carbon neutrality objective and the role that exported gas would play as a transitional energy source on world markets also represent concerns for the Innu First Nations. The public and non-governmental organizations also raised several concerns regarding greenhouse gas emissions linked to the Project – particularly in relation to the natural gas lifecycle – and their contribution to climate change. The Project's consistency with the greenhouse gas reduction plan and the targets of the Governments of Canada and Quebec was also contested.

During the construction phase, the main greenhouse gas emission sources would be transportation of materials and equipment to the Project site and the machinery and off-road vehicles operating on the site. Preparation of the ground, blasting and formwork and concreting for development of concrete slabs and facilities would also be likely to cause greenhouse gas emissions. The five years of construction would generate a total of 283 kilotonnes of CO_2 equivalent, including 263 kilotonnes (direct emissions, i.e., those directly under the Proponent's operations control) for the operation of machinery and civil engineering vehicles and 20 kilotonnes (indirect emissions, i.e., those not directly under the control of the Proponent) for transportation of materials and equipment necessary for construction (WSP, December 2020). These estimates are presented in Table 9.

[15] Contribution of the main greenhouse gases to climate warning in tonnes of CO_2 equivalent CO_2 = 1; CH_4 = 25; N_2O = 298; Black Carbon = 900.

Table 9: Greenhouse gas emissions over 5 years – Construction phase

Description of the source	Estimate of greenhouse gas emissions (kilotonnes)				
	CO_2	CH_4	N_2O	Black carbon	Total emissions (CO_2 equivalent)
	Direct emissions				
Machinery and civil engineering vehicles[16]	212.30	0.01	0.09	<0.01	263.52
	Indirect emissions				
Transportation of materials and equipment	18.87	<0.01	<0.01	<0.01	19.70
TOTAL	**231.17**	**0.01**	**0.09**	**<0.01**	**283.22**

In the operational phase (Table 10), the direct greenhouse gas emissions would come from processes associated with combustion (including preheating ovens, thermal oxidizers, pilots and flaring purges), as well as methane leaks from the natural gas liquefaction complex. These direct emissions are assessed at 459 kilotonnes of CO_2 equivalent per year. Indirect emissions would come from the electrical energy consumed by the complex in operation and the transit of tankers. These emissions are assessed at 30 kilotonnes of CO_2 equivalent per year. Thus, the total emissions generated by the Project would amount to 489 kilotonnes of CO_2 equivalent per year for the operating period.

[16] Including the concrete plant, i.e., approximately 0.53 kilotonnes of CO_2 equivalent, for projected production of 160,000 cubic metres of concrete.

Table 10: Greenhouse gas emissions per year – Operational phase

Description of the source	Estimate of greenhouse gas emissions (kilotonnes)				
	CO2	CH4	N2O	Black carbon	Total emissions (CO2 equivalent)
	Direct emissions				
Liquefaction process[17]	423.64	1.16	<0.01	<0.01	458.81
	Indirect emissions				
Transit of tankers[18-19-20]	-	-	-	<0.01	23.78
Electrical energy	5.77	0.00	<0.01	-	5.91
TOTAL	**429.41**	**1.16**	**<0.01**	**<0.01**	**488.50**

For the closure phase, the Proponent indicates that the activities likely to generate greenhouse gases would be associated with dismantling of the infrastructure. In particular, it mentions rehabilitation of the land and traffic of vehicles and machinery. The expected effects are similar to or less than those observed during the construction phase, but have not been calculated because the dismantling scenarios are not confirmed at this stage due to the Project's life span.

Environment and Climate Change Canada is of the opinion that the main sources of greenhouse gas emissions have been considered by the Proponent. Nevertheless, it considers that greenhouse gas emissions associated with marine transportation have been underestimated, that emissions due to equipment leaks could also be underestimated, and that there remains a certain degree of uncertainty in the quantification of these emissions. The use of conventional marine fuel by ship engines and emissions associated with the closure phase of the Project were not quantified either.

Environment and Climate Change Canada also questioned the Proponent's technological choices, particularly in relation to the energy efficiency of the flares and the energy consumption efficiency of the amine solution enrichment and regeneration process. According to them, there could be ways to improve combustion efficiency by using up-to-date combustion technologies. The objective is to target the best available technologies in energy consumption. The Proponent indicated that the acid gas elimination technologies would be the most energy saving of those qualified for the Project and that the improvement

[17] Includes the sources of continuous combustion (heating), the sources of periodic combustion (generators) and the fugitive sources.
[18] Includes the tanker fleet in transit (return trip between Les Escoumins and the study area), the tanker fleet in transit (study area, return) and the docked fleet.
[19] 200-ship scenario (Proponent's maximum operational scenario).
[20] The emissions in relation to navigation of an icebreaker from Les Escoumins to the Project site would add 0.13 kilotonnes of CO_2 equivalent for each trip. However, the Proponent indicates that it is impossible to determine the number of escorts required per year.

opportunities concerning flares are limited because this is a simple mechanism in which only maintenance of the pilot requires energy (WSP, December 2020). The technology with the lowest service levels, and thus the best energy efficiency, was retained by the Proponent in the description of its Project. However, the Proponent mentions that there is not necessarily a connection between replacement of an energy source and the energy efficiency of the system, since the objective is the reduction of greenhouse gases associated with the energy source and not the quantity of energy necessary (WSP, April 2021). Thus, the conversion of the heating units of the acid gas elimination system will be studied in detail in the context of the global strategy of achieving carbon neutrality, because it would allow reduction of greenhouse gas emissions (WSP, April 2021).

Environment and Climate Change Canada recognizes that the most significant source of greenhouse gas emissions is from the liquefaction process and that by using electricity rather than natural gas as the energy source, the process would be significantly less carbon intensive than most similar projects where the liquefaction process is fuelled by natural gas. Nevertheless, the Project may require the acquisition of new supplies by Hydro-Québec. Environment and Climate Change Canada is of the opinion that this potential change could generate incidental greenhouse gas emissions that were not considered during the Proponent's assessment. In addition, the MELCC mentions in its environmental analysis report that the significant amount of electricity that would be consumed by the project could not be used to decarbonize other emissive activities, or to power promising new businesses for the province of Quebec (MELCC, June 2021).

Change in Land Use

The calculation of greenhouse gas emissions must take into account emissions linked to the change in land use (Table 11). The greenhouse gas emissions associated with the projected deforestation of 111 hectares are 13.03 kilotonnes of CO_2 equivalent. For wetlands, the Project would involve drainage of eight hectares of wetlands and this loss would be equivalent to 0.4 kilotonnes of CO_2 equivalent. This loss of capacity to be withdrawn from carbon, due to the change in land use, is equivalent to a total of 13.43 kilotonnes of CO_2 equivalent per year.

Table 11: Greenhouse gas emissions linked to change in land use

Description of the source	Total emissions (kilotonnes of CO_2 equivalent)
Deforestation	13.03
Drainage of wetlands	0.40
TOTAL	**13.43**

According to Environment and Climate Change Canada, these emissions are, however, underestimated because of the methodology chosen by the Proponent and because the data used do not correspond to data for comparable sites.

Upstream Emissions

The lifecycle analysis[21] produced by the Proponent allowed assessment of the upstream greenhouse gas emissions. The emission sources include the preliminary work, exploration, extraction, treatment and closure of the natural gas extraction site (Table 12) and would be responsible for about 7,150 kilotonnes of CO_2 equivalent per year (WSP, January 2019). From this value, the Proponent assessed that the additional upstream greenhouse gas emissions linked to the performance of the Project would represent an increase of 0.05% to 0.08% of the emissions relative to the Canadian emissions level in 2017 (which amounted to 716,000 kilotonnes of CO_2 equivalent), i.e., emissions between 358 and 573 kilotonnes of CO_2 equivalent per year (WSP, June 2020, p.16 to 42).

Table 12: Upstream greenhouse gas emissions

Description of the source	Total emissions (kilotonnes of CO_2 equivalent)
Preliminary work	50.09
Exploration	485.16
Extraction	3,375.65
Treatment	2,128.25
Transportation	1,080.27[22]
Closure of the extraction site	35.33
TOTAL	**7,154.75**

It should be noted that the Gazoduq project, which is closely related to the Project, is currently being assessed under the *Impact Assessment Act* according to the Strategic Climate Change Assessment criteria. Thus, the Gazoduq project will also be subject to an analysis of upstream greenhouse gases associated with the development of gas fields in Western Canada.

Environment and Climate Change Canada agrees with the Proponent's estimate that the Project would increase upstream greenhouse gas emissions.

[21] A lifecycle analysis consists of compiling and assessing the inputs, outputs and potential environmental effects of the product during its lifecycle, i.e., from extraction of raw materials to their use.

[22] 326.48 kilotonnes of CO_2 equivalent per year are projected for transportation between Ontario and the Saguenay, within the Province of Quebec.

End Use of Liquefied Natural Gas

The purpose of the Project is commercial distribution of liquefied natural gas, which would be regasified at its destination. As mentioned in Chapter 3 of this report, the Proponent maintains that global demand for natural gas is growing strongly and that this growth is likely to continue, particularly due to the replacement of more polluting fossil fuels (coal and oil), economic growth of emerging countries, and reduction of use of nuclear energy in certain countries. Depending on how it would be used, the natural gas distributed could substitute for other forms of energy with a higher carbon intensity (diesel or coal). Such substitution would be likely to lead to a reduction of greenhouse gas emissions and atmospheric emissions. According to the scenario adopted by the Proponent, the commissioning of the Project would allow a reduction of global emissions of nearly 28,000 kilotonnes of CO_2 equivalent per year (WSP, December 2020).

Environment and Climate Change Canada considers that the Proponent did not provide enough details to support the assumption that the Project would replace higher-emission energy sources. While the Proponent argues that countries in Asia and Europe are seeking to reduce coal production and the emission intensity of their electricity systems, the Proponent offers little information that these regions would seek to replace coal specifically with liquefied natural gas. Environment and Climate Change Canada notes that the only scenario provided by the Proponent to estimate the replacement of coal with liquefied natural gas has a high level of uncertainty. Environment and Climate Change Canada is not aware of any credible modelling analysis to estimate the use of exported liquefied natural gas and has not conducted an analysis to determine whether exported liquefied natural gas would replace or supplement fossil fuels.

The Proponent mentions that the International Energy Agency states in its January 2020[23] report that the gas industry could be a key partner in the energy transition, provided it implements appropriate procedures and technologies to control its emissions. However, in 2021, the International Energy Agency issued a roadmap[24] indicating that countries must now forgo allowing the development of new oil and gas sites and expansions or new coal mines, to achieve net zero emissions by 2050, and limit global warming to +1.5 degrees Celsius. According to International Energy Agency models, existing or currently operating oil and gas projects would continue but fade by 2050. According to these models, liquefied natural gas exports would increase with a peak in 2025 before declining to less than half the 2025 volume by 2050. Since the Project would begin its operational phase in 2025 for a period of 25 to 50 years, it is likely that its life span would extend beyond 2050. Therefore, if the Project is approved, emissions from the Project and upstream emissions could have a negative effect on Canada's plan to achieve net zero emissions by 2050.

The Proponent has not signed any purchase and sale contracts with potential customers for the liquefied natural gas that would be produced by the Project. Therefore, it is impossible to validate the claim that the Project would allow the substitution of natural gas for more polluting fossil fuels. This consideration is also addressed by the government of Quebec in its decision to reject the Project. It states that the information provided by the Proponent does not allow for a conclusion on the environmental acceptability of the Project due to the issues for which there is still a great deal of uncertainty, notably its real effect on the global greenhouse gas balance and on the energy transition. The decision to refuse the Project is also based on

[23] International Energy Agency (2020), "The Oil and Gas Industry in Energy Transitions," https://www.iea.org/reports/the-oil-and-gas-industry-in-energy-transitions

[24] International Energy Agency (2021), "Net Zero by 2050," https://www.iea.org/reports/net-zero-by-2050?utm_campaign=IEA%20newsletters&utm_source=SendGrid&utm_medium=Email

the opinions and findings of the Bureau d'audiences publiques sur l'environnement, according to which the decision to authorize the Project should not be based on a net reduction in greenhouse gas emissions on a global scale, as this has not been demonstrated, and that the implementation of new liquefied natural gas exchange infrastructure could be an obstacle to the energy transition in the markets targeted by the Project (Government of Quebec, August 2021).

Mitigation and Follow-up Measures Planned by the Proponent

The Proponent proposes mitigation measures to minimize greenhouse gas emissions in the construction and operational phases (WSP, December 2020), particularly:

- Eco-driving[25] in its training for truck drivers and machinery operators, which could represent fuel economy of about 10%;
- Planning of trips to reduce the number of trips by truck and machinery used for construction;
- Use of motorized equipment in good working order that would lead to energy savings of around 5% to 20% via maintenance measures;
- Minimization of fugitive losses of greenhouse gases while ensuring the efficient operation of process equipment;
- Use of electrical equipment in the operational phase, when possible.

Environment and Climate Change Canada believes that the Proponent, in addition to committing to implementing the proposed measures, could commit to further reducing greenhouse gas emissions during the construction phase by using zero-emission equipment and vehicles, and during the operations phase by minimizing fugitive emissions from the process and tankers.

An environmental management plan, including measures to mitigate the Project's effects on air quality and greenhouse gas emissions of vehicle and equipment engines during construction would be deployed by the Proponent.

The Proponent also foresees a fugitive leak detection and repair program that complies with section 46 of the Regulation respecting the purification of the atmosphere from the Government of Quebec and would be implemented to control natural gas emissions. The Proponent indicates that this program would also meet the requirements of the Environmental Code of Practice for the measurement and reduction of fugitive emissions of volatile organic compounds resulting from equipment leaks. It should be noted that the federal regulatory requirements are more stringent for the leak detection program as of 2018 and the proponent would be required to meet both the provincial and federal regulatory requirements.

The Proponent also proposes an environmental follow-up program of greenhouse gas emissions for the purpose of quantifying the Project's actual greenhouse gas emissions during operations (WSP, January 2019). The data collected would be used to produce the reports required by the Quebec Regulation

[25] Eco-driving is defined by the application of driving tips and techniques that allow reduction of a vehicle's fuel consumption for the same service rendered. The central aspect of this new way of driving is meant to be efficient management of acceleration and deceleration. Engine idling is also a significant fuel consumption factor over which the driver has direct control (WSP, January 2020).

respecting mandatory reporting of certain emissions of contaminants into the atmosphere and the *Canadian Environmental Protection Act (1999)*. The sources included would be those associated with direct greenhouse gas emissions subject to these two regulatory frameworks. Upstream and indirect greenhouse gas emissions would not be included in the follow-up. Environment and Climate Change Canada recommends that the monitoring program proposed by the Proponent be expanded to include all emissions and phases of the Project and submitted in a report to the Agency. This data would be used to verify the effectiveness of greenhouse gas mitigation measures from the Project and inform updates to the carbon neutrality plan. The report should include greenhouse gas emissions for the year preceding the report for all emission sources quantified in the environmental assessment including process and combustion emissions, fugitive emissions, emissions associated with electricity use, emissions associated with tankers, and emissions associated with land use change using actual Project data.

The Proponent has also committed to implementing a carbon neutrality program[26] at the time of the plant's operation (WSP, December 2020). It indicates that this plan would apply to emissions accounted for and reported under the Regulation respecting mandatory reporting of certain emissions of contaminants into the atmosphere, effective from the first year of operation, and thus only to the emissions linked to the liquefaction process, which is equivalent to approximately 88% of the Project's emissions. Thus, the upstream greenhouse gas emissions in the construction phase, linked to the change in land use and indirect emissions, i.e., those linked to transit of ships and electrical energy, would be excluded from the carbon neutrality plan. The population, different environmental groups and the Innu First Nations questioned the credibility of the carbon neutrality objective proposed by the Proponent, due to the large quantity of emissions associated with the Project. Since the carbon neutrality plan only concerns the operational phase, the Proponent also indicates that its approach is necessarily restrictive and that it would not be possible to affirm the Project's carbon neutrality on the global scale (WSP, December 2020, Appendix R-2-33-1).

Among the measures proposed in the program, the Proponent notes source reduction, analysis of the possibilities of commercial reclamation of captured CO_2, investments in research on renewable natural gas production from forest residues and the purchase of carbon offset credits (WSP, December 2020, Appendix R-2-33-1). This program would be scalable and would have the primary objective of reducing source emissions as much as possible. The Proponent set a cost of $40/tonne of CO_2 as an overall cap for all projects, on a preliminary basis, indicating that it is unlikely that all the avoidance, capture or offset measures have the same cost. Moreover, the Proponent would be subject to the obligation to participate in the Government of Quebec's cap and trade system for greenhouse gas emissions allowances (SPEDE) (WSP, December 2020).

Environment and Climate Change Canada recognizes that the development of a carbon neutrality plan is complex and involves an evolving process that depends largely on the advancement of science, the techno-economic feasibility of technologies, and the establishment of partnerships. However, Environment and Climate Change Canada recommends that the principles of the Strategic Climate Change Assessment [27] be applied to ensure the credibility of the plan:

[26] Carbon neutrality results from a carbon balance equal to net zero emissions for each year of operation in the perimeter defined by the company (WSP, December 2020).

[27] Additional information on the plan to achieve net-zero emissions will be included in the forthcoming technical guide: https://evaluationstrategiquedeschangementsclimatiques.ca/

- Environment and Climate Change Canada recommends that the plan cover 100% of the Project's emissions and all phases of the Project.
- The Proponent notes that it has already received offset proposals for all estimated emissions at a cost well below $40/tonne for the first 10 years of operation. Environment and Climate Change Canada recommends that the Proponent consider the federal government's proposal to increase the price of carbon pollution gradually until it reaches $170/tonne in 2030 and the potential influence of this increase in the price of offset credits. Environment and Climate Change Canada also recommends that offset credits be issued from a Canadian regulatory offset program, that they not be used for compliance with any legal requirements, that they be issued on the basis of greenhouse gas reduction and removal that have already occurred (rather than anticipated), and that the reduction and removal be verified by an accredited third-party verification body. Environment and Climate Change Canada also recommends that offset credits be generated from activities that are quantifiable and that go beyond a business-as-usual scenario for the Project, which would reflect, among other things, legal requirements.
- In order for the purchase of offset credits in international markets to result in reductions in Canada, they must be fully compliant with the internationally transferred mitigation outcome (ITMO) rules set out in Article 6 of the Paris Agreement, any applicable decisions adopted by the Conference of the Parties, and any other international offset crediting criteria that will be developed by Environment and Climate Change Canada[28]. The purchase of offset credits for reductions occurring outside of Canada that do not conform to the standards of Article 6 of the Paris Agreement do not allow these reductions to be counted in Canada, and do not support Canada to reach climate change objectives.
- The Proponent plans to implement an annual audit process to validate the achievement of its carbon neutrality target. Environment and Climate Change Canada considers that this process would inform the carbon neutrality plan and recommends that the Proponent submit to the Agency, every five years, an update of its carbon neutrality plan to present the mitigation measures implemented and reflect any planned changes such as the introduction of technologies or practices to reduce greenhouse gases. The Proponent should submit a carbon neutrality plan at least one year prior to the construction phase and implement it for the life of the Project

5.1.2 Agency Analysis and Conclusions on Residual Effects

The Agency is of the opinion that the Project would result in significant adverse direct and cumulative transboundary environmental effects, given the effect that the Project's greenhouse gas emissions could have on the achievement of Quebec's and Canada's greenhouse gas emission and climate change objectives, despite the implementation of the mitigation measures proposed by the Proponent.

[28] The Government of Canada is still exploring whether and how ITMOs could be used to meet its climate targets. The Government is currently prioritizing actions to reduce emissions in Canada, but also recognizes that ITMOs could complement our domestic efforts and contribute to sustainable development abroad. Environment and Climate Change Canada has not yet developed a national framework to enable the use of ITMOs in the Canadian context.

Analysis of the Effects

The significance of the cumulative direct environmental effects of greenhouse gas emissions is determined by an analysis that considers the Project's greenhouse gas emissions compared to the total provincial and national emissions. They are followed by the Government of Quebec's and Canada's official greenhouse gas inventory, which monitors the cumulative effects of major projects.

Total Project's greenhouse gas emissions would be approximately 283 kilotonnes of CO_2 equivalent for the five years of the construction phase and around 489 kilotonnes of CO_2 equivalent annually for the operational phase. With the addition of emissions linked to the change in land use, i.e., around 13 kilotonnes of CO_2 equivalent per year, the Project would emit approximately 502 kilotonnes of CO_2 equivalent per year, in the operational phase. These emissions would represent approximately 0.6% of all greenhouse gases emitted in Quebec and 2% of emissions from the industrial sector in 2018 (MELCC, 2020). According to the MELCC environmental analysis report, the Project, once in operation, would be the 17th largest emitter of greenhouse gases in Quebec based on available data from 2019 (MELCC, June 2021). On the scale of Canada, the emissions from operations would represent approximately 0.07% of total greenhouse gas emissions inventoried in 2018 and 0.16% of energy use in stationary combustion (Environment and Climate Change Canada, 2020). By comparison, the top 10 emitters in Quebec emitted between 763 and 1,187 kilotonnes of CO_2 equivalent while the top ten emitters in Canada emitted between 4,785 and 11,783 kilotonnes of CO_2 equivalent (Environment and Climate Change Canada, 2021).

The Government of Quebec's Regulation respecting the environmental impact assessment and review of certain projects mentions that the construction of a plant or any other type of establishment or facility which, once in operation, would generate process or combustion emissions, other than those emitted by mobile equipment, up to 100 metric kilotonnes or more per year of CO_2 equivalent greenhouse gas, is subject to assessment and review of the environmental impacts. The projects subject to the environmental impact assessment and review procedure in the provincial environment belong to the high environmental risk category (MELCC, 2021). Because the emissions anticipated for the Project exceed this threshold, the Agency considers, in concordance with the Government of Quebec's intentions, that the Project would be part of the high environmental risk category.

The contribution of greenhouse gas emissions from the Project would be continuous and would contribute to the accumulation of greenhouse gases in the atmosphere and in the oceans in addition to being long-lasting and irreversible due to the persistence of CO_2. In its Plan for a Green Economy 2030[29], the Quebec government has committed to reducing its greenhouse gas emissions by 37.5% by 2030, a reduction of 54,000 kilotonnes of CO_2 equivalent compared to 1990 levels, and to becoming carbon neutral by 2050. To this end, the MELCC (MELCC, June 2021) and the Bureau d'audiences publiques sur l'environnement (BAPE, March 2021), indicate that any additional emissions in Quebec would increase the estimated level of additional reduction effort required to reach the 2030 target and that the arrival of a new emitter subject to the SPEDE would put upward pressure on the market. The MELCC environmental analysis report also mentions that the Project would pose a risk to the government of Quebec's achievement of carbon neutrality by 2050. (MELCC, June 2021).

[29] https://www.quebec.ca/en/government/policies-orientations/plan-green-economy/

For its part, Canada has been committed since 2016 to the Pan-Canadian Framework on Clean Growth and Climate Change (Framework)[30]. As such, the final Strategic Assessment of Climate Change[31], released in July 2020, requires proponents to provide a credible plan to describe how projects with a life beyond 2050 will achieve net zero emissions by that time. As this Project is being assessed under the *Canadian Environmental Assessment Act, 2012*, the Proponent is not required to provide a detailed plan to achieve net-zero emissions by 2050. The Proponent has committed to implementing a carbon neutrality program when the plant begins operation (WSP, December 2020). However, this program would not cover all emissions from the Project. In addition, building on the progress made under this Framework, the Government of Canada announced in December 2020 Canada's strengthened climate plan to accelerate action on climate change entitled A Healthy Environment and a Healthy Economy. The Prime Minister also announced on April 22, 2021 that Canada will increase its emissions reduction target under the Paris Agreement, known as the Nationally Determined Contribution, from 40 to 45% below 2005 levels by 2030. The *Canadian Net-Zero Emissions Accountability Act* was also assented to on June 29, 2021, formalizing Canada's goal of achieving carbon neutrality by 2050, and establishing a legally binding process to achieve it.

Thus, the effects of the Project could negatively influence the achievement of Quebec's and Canada's greenhouse gas reduction targets and would add to the challenge for governments to find ways to reduce emissions.

Furthermore, considering the upstream emissions (approximately 7,150 kilotonnes of CO_2 equivalent per year, including between 358 and 573 kilotonnes of CO_2 equivalent per year of additional emissions related to the Project), cumulated with the change in land use as well as the direct and indirect emissions expected during the operation phase, the Project would represent approximately 10% of Quebec's greenhouse gas emissions and 1% of Canada's. As noted by Environment and Climate Change Canada, if the Project were approved, emissions from the Project and upstream emissions could have a negative effect on Canada's plan to achieve net zero emissions by 2050. The estimate of cumulative greenhouse gas emissions can be characterized in the same way as direct emissions: high magnitude, continuous, irreversible, and global in range. As a result, the cumulative effects of upstream emissions, together with direct and indirect emissions from the Project, would be likely to result in significant adverse environmental effects.

Conclusion

The Agency recognizes that greenhouse gas emissions cause environmental effects on a global scale because of their cumulative nature and their contribution to climate change.

Consequently, despite the measures that will be deployed to limit greenhouse gas emissions, the Project would induce significant adverse direct and cumulative effects that could have an impact on the achievement of Quebec's and Canada's greenhouse gas emission and climate change objectives.

[30] https://www.canada.ca/en/services/environment/weather/climatechange/pan-canadian-framework.html (Updated: https://www.canada.ca/en/environment-climate-change/news/2021/04/canadas-enhanced-nationally-determined-contribution.html)
[31] https://www.strategicassessmentclimatechange.ca//

Determination of Key Mitigation Measures

In addition to the key mitigation measures in view of reducing the Project's effects on air quality (Section 5.10 – Human Health), the Agency determined the main measures that would contribute to reducing greenhouse gas emissions. However, these measures wouldn't be sufficient to render the residual effects insignificant. To determine the key mitigation measures, the Agency considered the mitigation measures proposed by the Proponent, the opinion of the government authorities, and comments received from the First Nations consulted and the public:

- Develop, prior to operation and to the satisfaction of Environment and Climate Change Canada, and implement, from the start of operation, a carbon neutrality program to achieve, for each year of operation, a carbon footprint equal to zero net emissions for greenhouse gas emissions generated by the liquefaction process associated with the project Ensure that the offsets required to achieve carbon neutrality comply with the offset criteria required by Environment and Climate Change Canada;
- Develop, to the satisfaction of Environment and Climate Change Canada, a greenhouse gas management plan to reduce the Project's greenhouse gas emissions during each phase and submit a plan to the Agency before the construction phase. The greenhouse gas management plan applies to greenhouse gas emissions other than those covered by the carbon neutrality program. The emphasis should be placed on reduction of greenhouse gas emissions as soon as possible during the Project's lifecycle. It will need to take into account applicable provincial and federal greenhouse gas reduction strategies. The greenhouse gas management plan must include the following measures:
  - Identify all the main sources of direct and indirect greenhouse gas emissions applicable to each phase of the Project covered by the greenhouse gas management plan;
  - Provide a list of technologies and practices to reduce greenhouse gas emissions for each emission source identified, particularly the technologies emerging at an advanced stage of technological development or that could become technically and economically feasible during any phase of the Project;
  - Conceive a plan depending on the list of technologies and practices that are technically and economically feasible to deploy these technologies and practices over the course of the Project. The implementation plan will have to account for the time when the equipment must be replaced and provide for their replacement with equipment and practices with lower greenhouse gas emission intensity;
  - Establish greenhouse gas emissions reduction objectives at specific intervals, depending on the implementation plan that aim to achieve carbon neutrality for all Project emissions;
  - Identify all the obstacles, challenges and risks associated with the implementation of the plan and how the Proponent intends to overcome them.
- Include eco-driving in the training for drivers and machinery operators;
  - Apply driving tips and techniques that allow reduction of a vehicle's fuel consumption for the same service rendered, especially with regard to acceleration and deceleration;
  - Document driver and operator participation in training.

- Offer a shuttle service for the workers to reduce the number of vehicles on the site during the construction phase. Implement incentives for workers to use the shuttle service;
- Limit the off-duty operation of any motorized equipment or vehicle, including when not in use or on standby for a period exceeding five minutes during all phases of the Project;
- Use motorized equipment in good working order;
    - Ensure the mufflers and catalytic converters (antipollution system) of the machinery are in good working order.
- Implement measures to mitigate atmospheric emissions, including greenhouse gas emissions, particularly in:
    - Evaluate pilot nozzle gas consumption when selecting flare equipment to improve energy efficiency;
    - Using zero-emission equipment and vehicles. In the event that a particular piece of zero-emission equipment or vehicle is not available or not technically or economically feasible, the Proponent should provide justification to the Agency and use a diesel or low-carbon fuel equipment or vehicle that meets, at a minimum, Tier 4 emission standards;
    - Requiring that operators of ships intended to supply liquefied natural gas use ships that satisfy the most stringent U.S. Environmental Protection Agency emissions standards in effect at the time the tankers will begin operating in Canadian waters.
- Adopt primary measures to reduce methane losses (related to engine design and operation) or secondary measures, i.e., measures at the exhaust outlet. In doing so, capture evaporative gases from tankers for use in powering the vessels' main and auxiliary engines and provide vessels with reliquefaction units in case the power requirement is less than the evaporation rate;
- Installing and maintaining a shore power connection during the operational phase so that any tanker capable of connecting to it can do so while at berth;
- Use liquefied natural gas to power dual fuel generators during normal operations unless it is not technically or economically feasible. If an alternative energy source is required, the Proponent shall submit a justification to the Agency prior to operation.

Need for Follow-up and Follow-up Requirements

The promoter proposes an environmental follow-up program for greenhouse gas emissions, given the Project’s strong contribution to greenhouse gas emissions on the scale of the province and the country. To validate the prediction of transboundary effects or the effectiveness of the mitigation measures, the Agency considers that the environmental follow-up programs for greenhouse gas emissions proposed by the Proponent should include the following requirements:

- Review and update, to the satisfaction of Environment and Climate Change Canada, the carbon neutrality program every five years to validate the achievement of the program's objectives and to maximize the reduction of greenhouse gas emissions at the source. When updating the carbon neutrality program, consider the results of the monitoring program and any new technically and economically feasible greenhouse gas emission reduction and energy efficiency technologies or practices that the Proponent has implemented or plans to implement;

- Review and update the greenhouse gas management plan, in consultation with Environment and Climate Change Canada, after the fifth year following the start of construction and thereafter as determined at each review, but at a minimum every five years for the life of the Project, to adapt to the changes in circumstances and emerging technologies in order to further reduce greenhouse gas emissions. The update of the plan shall be done and shall include the following points:
  - Provide the greenhouse gas emissions directly attributable to the Project produced over the past five years, as well as the methodology, the assumptions and all the supporting data, as follows:
    - Emissions directly linked to the Project's operation;
    - Emissions coming from construction and dismantling activities, transportation activities that are not directly linked to the Project's operation, and other types of indirect emissions attributable to the Project;
    - These emissions must be estimated by the method set out in the Canada's Greenhouse Gas Reporting Quantification Requirements (Greenhouse Gas Reporting Program). If the methods for certain emission sources are not specified for an activity in Canada's Greenhouse Gas Quantification Requirements, it will be acceptable to use other methods compliant with the 2006 Intergovernmental Panel on Climate Change Guidelines for National Greenhouse Gas Inventories. The Proponent must clarify and justify the methodology used for quantification of the Project's greenhouse gas emissions.
  - Provide a description of the activities undertaken or deployed to reduce greenhouse gas emissions over the past five years. If this description does not correspond to the projected activities, please provide a justification.
- Update the list of technologies and practices to reduce greenhouse gas emissions, particularly emerging technologies at an advanced technological development stage that could become technically and economically feasible over the next few years, and the update of the implementation plan for technologies and practices to further reduce greenhouse gas emissions over the next few years and revise greenhouse gas projections accordingly.

5.2 Marine Mammals, including St. Lawrence Beluga Whale

5.2.1 Analysis of Potential Effects and Proposed Mitigation Measures

The analysis of effects on marine mammals takes into consideration injuries and behavioural changes that may be caused by underwater noise from marine infrastructure construction and vessel traffic, as well as the risk of injury and mortality from vessel strikes. The Agency considered marine mammals listed on Schedule 1 of the *Species at Risk Act* and species for which the Committee on the Status of Endangered Wildlife in

Canada (COSEWIC) recommends a status under the *Species at Risk Act*. Marine mammals and their habitat are also protected under the *Fisheries Act*.

The Agency is of the opinion that the Project would cause significant adverse environmental effects on marine mammals, including species at risk, given the disturbance that would be caused by the tankers, even following the application of mitigation, monitoring and follow-up measures. Since the marine shipping generated by the Project would combine with that of other past, present or projected activities in the Saguenay River and the St. Lawrence Estuary, the Agency also believes that the Project would cause significant cumulative adverse environmental effects.

In determining the significance of effects on marine mammals, the Agency assessed, among other things, whether the effects could adversely affect the conduct of one or more important lifecycle phases of marine mammals or the maintenance of their populations. The Agency also assessed whether the Project would adversely affect the maintenance, management or recovery of species at risk.

Description of the Component

The conservation and the protection of marine mammals in Canada are covered, among other things, by the Marine Mammal Regulations under the *Fisheries Act*. The species likely to be observed in the vicinity of the marine infratrustures are the harbour seal, which frequents the area regularly, although there is no haul out in the vicinity of the site, and the St. Lawrence beluga whale, which frequents the site occasionally. These species are also likely to be found along the Saguenay River and in the St. Lawrence Estuary. Other species likely to frequent the estuary and the mouth of the Saguenay River are the blue whale, the humpback whale, the fin whale, the minke whale, the porpoise, the grey seal and the harp seal.

Mammal species at risk that may be affected by this Project are presented in Table 13.

Table 13: Marine mammal species at risk likely to frequent the Saguenay River and the St. Lawrence Estuary

Species		Status of the species	
Common name	Scientific name	*SARA* (Schedule 1)	COSEWIC
St. Lawrence beluga whale	*Delphinapterus leucas*	Endangered	Endangered
Blue whale	*Balaenoptera borealis*	Endangered	Endangered
Fin whale	*Balaenoptera physalus*	Special Concern	Special Concern
Harbour porpoise	*Phocoena phocoena*	Not registered [32]	Special Concern

[32] Under review for addition.

Under section 79 (2) of the *Species at Risk Act*, the Minister of Environment and Climate Change is required to determine the adverse effects of the Project on species at risk and, if the Project is carried out, to ensure that measures consistent with recovery strategies and any applicable action plan are taken to avoid, mitigate and monitor those effects.

The species likely to be affected are highly valued by First Nations and the general population. The tankers will pass through the Saguenay–St. Lawrence Marine Park, a protected area with an ecosystem protection mandate. Indeed, the marine park was created under an agreement signed in 1990 by the governments of Quebec and Canada. The concerns of the regional community for the protection of the beluga whale and its habitat were a determining factor in the creation of this park, which was a pioneering project across Canada. In addition, the environmental effects of navigation on marine mammals, particularly the beluga whale, could have repercussions on tourism (Tourisme Saguenay-Lac-Saint-Jean, June 2019). The beluga is an emblematic species of the biodiversity of the St. Lawrence Estuary and, since the 1980s, a global symbol of threatened wildlife. Its presence in the sector is one of the reasons for the creation of the Saguenay-St. Lawrence Marine Park.

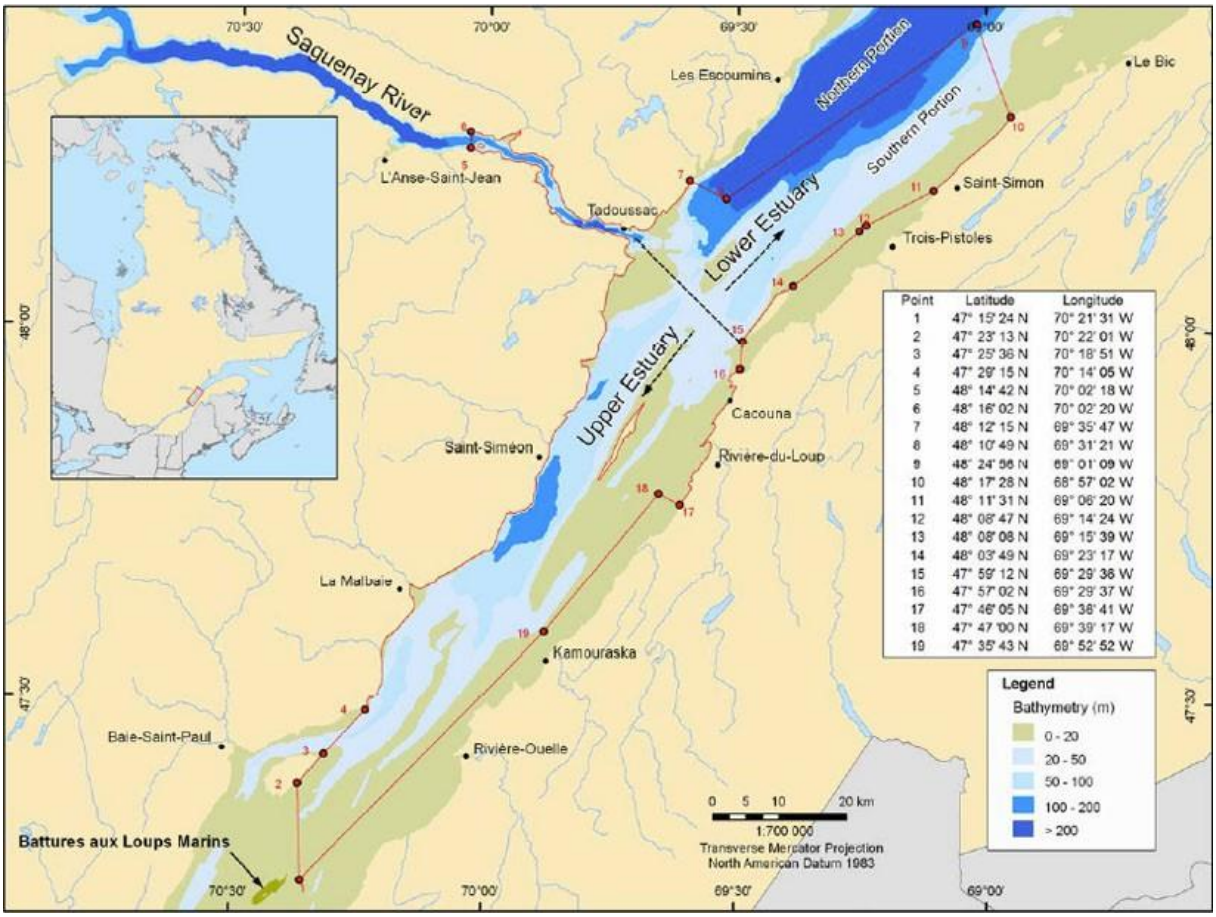
The potential effects of the Project, including navigation, on the regional economy and tourism are discussed in section 5.9 – Socioeconomic conditions of this report. The effects on the cultural heritage of the First Nations and on the Saguenay–St. Lawrence Marine Park are examined in section 5.8.

The beluga whale's critical habitat extends from the Loups-Marins flats to the southern portion of the estuary off Saint-Simon, including the downstream portion of the Saguenay River (Figure 7). The marine park protects thirty-seven percent (37%) of all beluga whale summer critical habitat. At present, it is estimated that the beluga whale population numbers about 900 individuals. Anthropogenic noise, particularly from marine shipping, is identified as one of the main threats to the recovery of this population and an adequate noise environment is a component of its critical habitat in the Recovery Strategy for the Beluga Whale (Fisheries and Oceans Canada, 2012). Beluga whale use of the Saguenay River varies at different times of the year and from year to year. However, according to available data, beluga whales are present at the mouth and even in the Saguenay River as early as mid-April. Approximately half of the adults (all sexes combined) and two-thirds of the adult females frequent the Saguenay River (Chion *et al.*, 2019). In addition, the use of the Saguenay River by individuals most sensitive to noise disturbance, namely females, calves, and young, is well documented (Conversano *et al.*, 2017; Ménard *et al.*, 2018; Chion *et al.*, 2020). The effects of disturbance, in combination with other threats, such as environmental contamination, changes in prey type and abundance, and low genetic diversity, could impact the reproductive success of the population (Ménard *et al.*, 2014; Fisheries and Oceans Canada, 2014).

For the blue whale, the portion of the estuary within the extended study area (east of Les Escoumins) is intensively used by the species for feeding and is recognized as important habitat that could be designated as critical habitat. The Recovery Strategy for the Blue Whale identifies the effects of marine shipping as a threat to this species, whose Northwest Atlantic population likely numbers fewer than 250 individuals (Fisheries and Oceans Canada, December 2009). Anthropogenic noise has been identified as a high-risk threat as it degrades the underwater acoustic environment and alters the behaviour of blue whales. Vessel strikes are considered a medium to high-risk threat, as blue whales are known to be vulnerable to collisions with large vessels.

Finally, the Saguenay–St. Lawrence Marine Park Marine Activities Regulations prescribe speed limits (25 knots in general and 15 knots at the mouth of the Saguenay River from May 1 to October 31), minimum approach distances (at least 400 m from beluga whales), and behaviours to adopt in the presence of whales. From June 21 to September 21, boats must not enter the Sainte-Marguerite Bay exclusion zone, an integral preservation zone designed to protect female beluga whales, calves and young. The Upper Estuary area has also been closed to marine mammal watching tours since 2019.

Figure 7: Essential habitat of the St. Lawrence beluga. Inset: location of the sector in Quebec.



Source: Beluga whale (Delphinapterus leucas), St. Lawrence Estuary population, recovery strategy, Fisheries and Oceans Canada, 2012

Potential Effects

During the construction phase, the potential effects of the Project on marine mammals are mainly related to the disturbance of individuals that may be present in the vicinity of the Project site (in particular, in connection with the modification of the sound environment), to accidental spills of hydrocarbons or hazardous materials during the work (this element is discussed in greater detail in section 6.1 – Effects of Accidents and

Malfunctions), as well as the risk of collision with vessels and barges used for the construction of marine infrastructure (blasting, drilling, machinery traffic on shore, etc.). Construction of marine infrastructure would occur outside of critical beluga whale habitat.

During the operational phase, loading activities and the traffic of tanker and support vessels could cause effects on marine mammals, either through habitat loss or disturbance (for example, alteration of the underwater sound environment, accidental spills of oil or hazardous materials into the marine habitat) or through disturbance of individuals (for example, during a vessel strike).

Underwater Noise

Underwater noise can affect fish and marine mammals. Effects include communication masking, behavioural changes (decreased foraging success, habitat avoidance, lower reproductive rates), injury and mortality. Since fish and marine mammals must be in close proximity to a significant noise source, such as an explosion or blasting activity, in order for it to cause injury or mortality, these effects are uncommon. However, marine mammal behaviour is particularly sensitive to noise due to masking effects (Erbe *et al.*, 2019). Masking effects occur when marine mammals are unable to discern sounds from prey, other marine mammals, or human-made sounds due to overlap in part of the sound frequency range used by the species. As a result, marine mammals have difficulty finding food, locating resting and recovery areas, communicating with each other and reproducing. The effects of vessel traffic can result in whales experiencing a temporal and spatial narrowing of their acoustic communication space (Fisheries and Oceans Canada, July 2018). Because young marine mammals have less communication space than adults, they are more sensitive to noise that can interfere with vocalizations used for feeding, breeding, or socializing (Chou *et al.*, 2021). In addition, increased vessel numbers lead to increased avoidance behaviours (longer dives and faster swimming) and other physical and acoustic behavioural changes (Blane and Jaakson, 1994; Lesage *et al*., 1999).

Noise can act in two ways, either by reducing the duration of quieter periods between noisy events, or by chronically increasing ambient noise levels due to the great distance to which noise can propagate, especially for low-frequency sounds. The addition of noise can thus reduce the acoustic space usable by marine mammals both spatially and temporally, which may force animals to channel their life functions during quieter periods or restrict them to smaller areas.

During construction, the installation of marine infrastructure would generate acoustic disturbances in the Saguenay River that could affect marine mammals located near the work. The noise generated would be mainly due to infrastructure construction activities, mainly drilling and vibrofracturing of piles, and to the transit of vessels and barges required for the work. These activities would generate impact noise, continuous noise as well as continuous transient noise with the potential to disturb, disturb or injure marine mammals depending on the sound level emitted and perceived.

During operations, the Project would have the potential to add approximately 300 to 400 vessels transits per year on the Saguenay River and in the St. Lawrence Estuary, a significant increase compared to the current 450 transits. The preliminary analysis used by the Proponent on changes in the sound environment of beluga whales and other marine mammals allows to assess the potential effect that would be caused by the passage of large vessels in the Saguenay River. However, as the Proponent acknowledges, there is no published data on the noise generated by future project tankers in the Saguenay River. It therefore referred to the approximation of JASCO Applied Sciences (2016) which established, notably from data of oil tankers of

comparable dimensions, the basis for understanding the perimeters in which the noise generated by future operations could be critical for aquatic fauna.

However, Fisheries and Oceans Canada and Parks Canada have raised two shortcomings that require caution in interpreting the results of the assessment:

1. Noise measurements or data from tankers, rather than merchant vessels in general, would have been more representative of the noise levels likely to be generated by the Project; and
2. The contribution of the tugs that would accompany the tankers has not been evaluated by the Proponent.

The additional traffic would affect a portion of the beluga whale's critical habitat in the Saguenay-St. Lawrence Marine Park and the Saguenay River, particularly in the area between the mouth and Baie Sainte-Marguerite. According to the Saguenay-Charlevoix ZIP Committee (June 2019), the increase in heavy maritime traffic through the Sainte-Marguerite Bay staging area could compromise the effectiveness of conservation measures in the sector implemented by the marine park, particularly the effectiveness of the summer exclusion zone, which is supposed to provide a quiet site for beluga whales. This sector is regularly frequented by females, juveniles and calves, which are a particularly vulnerable segment of the population. In addition, Fisheries and Oceans (July 2018) notes that current knowledge is insufficient to determine what levels of noise and vessel traffic may elicit a behavioural response in beluga whales and what effects such a response has on their ability to carry out their life functions. However, it has been shown that the transit of each vessel through the Saguenay River is likely to mask the communication and echolocation[33] of beluga whales for several minutes and to interfere with the performance of certain vital functions such as calf rearing or feeding. Thus, the increase in marine shipping in areas used by the species may affect beluga whales frequenting the Saguenay River and the St. Lawrence Estuary by decreasing quieter periods and chronically increasing ambient noise levels (Fisheries and Oceans Canada, 2018). In addition, the increase in noise generated by marine shipping associated with the Project is also likely to result in effects on fin whales and blue whales in the St. Lawrence Estuary (Fisheries and Oceans Canada, June 2021).

Furthermore, Fisheries and Oceans Canada and Parks Canada are concerned that the increase in marine traffic associated with the Project could hinder the implementation of certain measures of the action plans, including the Action Plan to Reduce the Impact of Noise on the Beluga Whale and Other Marine Mammals at Risk in the St. Lawrence Estuary (Fisheries and Oceans Canada, 2020), and the recovery measures proposed in the recovery programs for marine mammals at risk in the St. Lawrence Estuary. Furthermore, as mentioned by Parks Canada in its notice of June 11, 2021, the increase in the number of ship passages in the marine park could compromise its ability to fulfill its mandate, which is to increase the level of protection of ecosystems for present and future generations. It could also result in increased risks to species at risk in the Saguenay River and St. Lawrence Estuary, particularly in relation to increased noise.

[33] Means of locating obstacles or prey, used by various animals living in the dark (bats) or in the water (whales), and consisting of emitting ultrasound or high-pitched sounds and assessing the return time of their echo in various directions.

Collisions

The vulnerability of marine mammals to collisions varies according to the species. The beluga whale is known to be agile and collisions between commercial vessels and the species are not frequent. However, the consequences of a collision are potentially serious and an increase in collisions could hinder the recovery of the species. Such collisions are also infrequent for seals, due to their high agility in avoiding moving watercraft (WSP, January 2019). However, the risk of collision is of greater concern for larger marine mammals, particularly fin whales, which are recognized worldwide as the most vulnerable whale species to collisions, accounting for approximately 43% of collision victims in the St. Lawrence Lower Estuary (WSP, January 2020). Blue, humpback and minke whales are also known to be vulnerable to the risk of collision with large vessels. Considering the precarious situation of several whale populations, the mortality of individuals by collision represents an additional threat to the recovery of species at risk.

Cumulative Effects

Commercial hunting of beluga whales began in the 1600s and continued almost uninterrupted until the 1950s, making it the main factor responsible for the decline of the beluga population (Fisheries and Oceans Canada, 2012). Nearly 15,000 beluga whales are thought to have disappeared between 1880 and 1950 alone, a period considered the most intensive for hunting. Despite the ban on hunting in 1979, other factors such as increased industrialization and pollution, which may be responsible for chronic disease in beluga whales, as well as habitat disturbance due to marine shipping have contributed to the decline of the species.

In its assessment of cumulative effects, the Proponent considered several major projects[34] in the Saguenay River and the St. Lawrence Estuary as far as Les Escoumins[35], namely the Black Rock Metals, Ariane Phosphate and North Shore Terminal projects, which would increase maritime traffic if they were to be implemented (WSP, January 2019). These projects would be in addition to the activities of the Port of Grande-Anse, which has been underway since 1984, as well as the development of the resort industry, including cruises, and the region's recreational and tourism sites[36] (WSP, January 2019). If the three projects mentioned above were to go ahead, marine traffic in the Saguenay River could reach 1,350 commercial vessels transits annually, or about four vessels transits per day or triple the current situation. For the St. Lawrence Estuary, there would be an increase of nearly 19% in transit. This increase in marine traffic would increase the risk of collision and the level of underwater noise for marine mammals. Furthermore, this increase would have the potential to reduce the temporal and spatial windows of opportunity for beluga whales, whether to feed efficiently, detect or communicate with conspecifics, or detect hazards (Fisheries and Oceans Canada, July 2018).

Recent studies by the Université du Québec en Outaouais team (Chion *et al.*, 2020) show that the increase in marine traffic associated with four proposed industrial-port projects on the shores of Saguenay River (i.e., 820 additional transit spread evenly over one year), would be higher in the Saguenay River compared to current traffic than in the Lower and Upper Estuary. Although this work is still in progress, the first results have shown that individuals who frequent the Saguenay River more frequently are more affected by

[34] Evaluated over a 50-year horizon.
[35] For the beluga whale, its critical habitat area was also considered in the Proponent's assessment of cumulative effects.
[36] Undated.

underwater noise from vessels. The authors of this study specify that, considering the projects taken into account, the relative increase in noise periods for beluga whales frequenting Saguenay River would be of the order of more than 450%. It is therefore important to integrate the social and spatial dynamics of the beluga population, i.e., their fidelity to Saguenay River, in order to make a more realistic assessment of the impact of underwater noise from marine shipping on the groups of belugas that prefer this area.

In the St. Lawrence Estuary, the marine shipping associated with the Project would result in an increase of approximately 8% compared to the 4,770 annual transit currently in use. The Proponent justifies the absence of significant cumulative effects that would be caused by the marine shipping associated with its Project by invoking the small contribution of the Project to the current and projected traffic in the St. Lawrence Estuary. According to Fisheries and Oceans Canada and Parks Canada, this interpretation does not take into account the fact that current noise levels and the risk of collision have already been identified as threats to the survival and recovery of the Beluga and blue whale populations.

Mitigation and Follow-Up Measures Planned by the Proponent

For the construction of the marine infrastructure, the Proponent proposes various measures to limit acoustic disturbances as much as possible. Although the site is located outside of the beluga whale critical habitat, these measures would limit acoustic disturbance to all marine mammals, as well as avoid effects on individuals that occasionally visit the site. The measures include:

- The establishment of a marine mammal exclusion zone in the vicinity of the work;
- Drilling with rotary heads and pile driving by vibration;
- The progressive and continuous implementation of drilling and pile driving works;
- The use of bubble curtains; and
- The realization of major works in the marine environment from 7:00 a.m. to 7:00 p.m. from Monday to Friday, in order to allocate noise-free periods for marine mammals.

According to Fisheries and Oceans, the use of a bubble curtain could, however, prove difficult to implement because of the depth and currents present in the sector. Thus, the Proponent would test, at the beginning of the work, the installation of a foam sheath or an insulating sheath around the piles or shock-absorbing pads. These measures would be tested and, if necessary, extended to the installation of each pile if deemed feasible and useful.

The Proponent mentions that, as far as possible, the sinking work and the taking of measurements will be initiated outside of the period of potential beluga whale presence in the sector (April to October). Final marine mammal monitoring procedures will be developed in conjunction with Fisheries and Oceans Canada, based on *in situ* data collected at the beginning of the noisy work. Marine mammal monitoring during in-water construction would be conducted from April to October, which is the period of time when beluga whales are most likely to be present in the Project area. Should marine mammals be present in the marine mammal exclusion zone in the vicinity of the work, the work would be halted. The exclusion zone would be established according to the threshold at which temporary damage to hearing is possible for each species. Without the implementation of other mitigation measures, this zone could extend up to 5.6 kilometres for beluga whales and 3.5 kilometres for seals. In its notice, Fisheries and Oceans Canada mentions that the critical distance for temporary damage to the hearing of marine mammals without mitigation cannot be effectively monitored

during the work and recommends that mitigation measures be put in place as soon as the work begins, which the Proponent has committed to do.

During the operational phase, the Proponent proposes mitigation measures to reduce underwater noise, including:

- Keeping vessel speeds below 10 knots between Les Escoumins and the Project site (below 8 knots in the Grosse Île area[37]);
- Integrating the latest noise reduction technologies into tankers;
- Regularly cleaning and repairing the propellers and hulls of tankers;
- Establishing a monitoring program for underwater noise emissions during operations; and
- Collaborating in scientific research on underwater noise, financially or by sharing its monitoring data.

The technologies that could be integrated into the tankers presented by the Proponent as mitigation measures would certainly have a noise reduction potential. Furthermore, the Charter for the Protection of Marine Mammals, developed by the Proponent, demonstrates its willingness to find solutions to reduce underwater noise. However, their actual effect on tanker noise levels remains unproven, as does their effect on the duration and intensity of beluga exposure to these noise levels. In addition, no mitigation measures have been proposed to reduce underwater noise from tugboats.

Although data are available on the correlation between vessel speed and collision risk (Chion *et al.*, 2012 and Chion 2017), the effects of reducing speed to 10 knots on the underwater noise generated and the exposure of marine mammals to that noise are not quantified. In addition, the speed restriction has the effect of extending the period of exposure to marine mammal noise, which may be more detrimental. In its June 2021 notice, Transport Canada presented a review of knowledge about different technologies for reducing underwater noise. Of all the measures proposed by the Proponent, several are considered basic and are primarily aimed at making a vessel as fuel efficient as possible. Examples include hydrodynamic design of vessels, maintenance and cleaning of propellers, application of antifouling paint and cleaning of biofouling on the hull. In Transport Canada's view, these technologies are industry best practices for vessel efficiency, rather than mitigation measures to reduce underwater noise from vessels.

Other measures presented as being currently under study by the Proponent could prove to be effective for the reduction of underwater noise. These include the installation of a diesel-electric motorization, the installation of machinery on resilient mounts, or the installation of acoustic enclosures around the machinery. As these are under study and not confirmed by the Proponent, it is not possible to rely on their implementation in the evaluation of the mitigation measures proposed by the Proponent.

According to the Huron-Wendat Nation, the speed of vessels at 10 knots should be part of the Project requirements and should be reduced, particularly in the vicinity of the temporary exclusion sector of Sainte-Marguerite Bay (Conseil de la Nation huronne-wendat, June 2019). The Innu First Nations and the Huron-Wendat Nation are also of the opinion that proactive measures to protect the beluga whale and its habitat

[37] Known as Île Saint-Louis, it is located slightly upstream from Baie Sainte-Marguerite. Its coordinates are: 48.248932 North, -70.0232627 West

should be implemented by the Proponent. In this sense, the Proponent has committed to implementing any suggestions regarding the reduction of effects on marine mammals that would result from the expanded advisory committee on the Project and any other committee or consultation body on navigation issues, including Transport Canada's initiative on the assessment of the cumulative effects of marine shipping in which the Innu First Nations, the Wolastoqiyik Wahsipekuk First Nation and the Huron-Wendat Nation participate. The proposed measures would also be discussed within the joint committee set up by the Proponent with the Innu First Nations or the environmental subcommittee, in which the Innu First Nations also participate, to ensure that their concerns are addressed. The Huron-Wendat Nation and the Proponent have also agreed that exchanges will take place to document the First Nation's suggestions for measures or initiatives related to beluga conservation and to discuss their implementation.

In its June 2021 notice, Fisheries and Oceans indicates that the most effective measure that should be prioritized to counter the effects of noise remains avoidance, i.e., the absence of overlap between vessels and beluga whales. As such, locating the terminal on a site that would have avoided an increase in marine shipping in the Saguenay River would have represented a solution of lesser impact for this Project. In addition, other measures aimed at limiting the overlap in time and space of vessels and beluga whales should have been explored. However, the Proponent did not present any measures that would have aimed at adjusting the navigation schedules on a daily or seasonal basis in order to avoid sensitive periods, which would have represented a major adjustment to the Project.

The Proponent proposes a two-part underwater noise monitoring program:

- In the vicinity of the site, during the first two weeks of construction, to validate the results of the simulations and adjust the distance of the exclusion zone or the mitigation measures, if necessary. Ideally, this initial work would be done outside the period of potential whale presence; and
- During docking and loading operations as well as during the transportation of liquefied natural gas during the operational phase of the Project.

In addition to the measurements that would be carried out at the port infrastructure site, the Proponent plans to measure the noise footprint of the tankers in the Sainte-Marguerite Bay sector, a particularly sensitive sector of the beluga whale's critical habitat. Since the sectors concerned by the monitoring of underwater noise during the operational phase are mainly frequented by the beluga whale, the harbour seal and, more sporadically, the minke whale, these three species would be monitored as part of the program put in place. Should the results of the monitoring show that the underwater noise emitted by navigation exceeds the established thresholds and the forecasts presented in the impact study, the Proponent undertakes to adapt, as much as possible, navigation in order to minimize the effects on the species according to methods that could be identified in the framework of recent or ongoing studies on beluga whale behaviour. For example, the hours of transit could be adapted according to critical periods (day/night, tides, etc.). No collision or sound level monitoring program is proposed for the estuary area or for fin or blue whales.

In addition, the Proponent has committed, within the framework of its work related to its Charter for the Protection of Marine Mammals, to continue its research on technologies for the reduction and attenuation of underwater noise and to integrate the addition or modification of equipment into the vessel's maintenance program. Thus, during major dry-dock maintenance, scheduled every five years, equipment or technologies whose effectiveness has been demonstrated will be integrated into the vessel, following a cost-benefit analysis (WSP, April 2021).

The Proponent has committed to ensuring the participation of Innu First Nations in the environmental monitoring and follow-up programs through the existing environment subcommittee. In addition, the results of the follow-up programs would be presented and discussed with the First Nations concerned, notably through the tabling of the follow-up reports at the environment subcommittee for Innu First Nations and at the designated drop-off point in the context of discussions related to the implementation of a collaboration agreement for the Huron-Wendat Nation.

5.2.2 Agency Analysis and Conclusions on Residual Effects

The Agency concludes that, despite the implementation of the key mitigation measures identified below, the Project is likely to result in direct and cumulative significant adverse environmental effects on marine mammals, including beluga whales.

The governments of Canada and Quebec are currently funding several initiatives and programs for the protection and research of marine mammals (for example, Canada's Oceans Protection Plan, the Action Plan to Reduce the Impact of Noise on the Beluga Whale and Other Marine Mammals at Risk in the St. Lawrence Estuary, the *Marine Mammal Regulations*, Parks Canada's Conservation and Restoration Program: Sharing the waters with belugas). These initiatives aim to increase knowledge and attempt to mitigate the effects of commercial shipping on marine mammals at risk, particularly those living in the St. Lawrence and Saguenay rivers. Although much research is ongoing, the available scientific knowledge shows that increased marine shipping traffic would be counterproductive to the recovery efforts of several marine mammal species at risk. The projects would lead to an increase in vessel traffic in a part of the beluga whale's critical habitat that is still relatively quiet and located in a protected area. Based on current knowledge, high risks to the beluga whale cannot be ruled out, given the precariousness of the species and the identification of noise as a risk factor to its recovery. The most recent Action Plan for the Blue Whale (Fisheries and Oceans Canada, July 2020) also identifies anthropogenic noise as one of the main threats to the recovery of this population.

Furthermore, the increase in marine traffic that would be caused by the Project and all the current and projected marine traffic in the study area run counter to some of the objectives and measures of Fisheries and Oceans Canada's St. Lawrence Estuary Marine Mammal at Risk Recovery Plans and Programs. Consequently, the absence of recovery could in turn compromise the ability of the marine park to meet its mandate of enhancing the level of protection of ecosystems for present and future generations.

Analysis of the Effects

As the marine infrastructure is located outside of the beluga whale critical habitat and the area is not frequented by other marine mammals, the Agency is of the opinion that the construction phase of the terminal would not result in a residual effect on these species, including beluga whales and seals, taking into account the key mitigation measures identified below and to be specified in the regulatory phase.

With respect to the operational phase, the Agency is of the opinion that the activities are unlikely to have a significant negative impact on seals because, with the exception of potential accidents or malfunctions (see section 6.1), marine shipping is not likely to interfere with one or more important phases of the species' lifecycle. With respect to harp seals, which are mainly present in the St. Lawrence Estuary during the winter

period, marine shipping associated with the Project would operate in the main marine shipping corridor and should therefore not affect ice conditions compared to existing conditions.

For marine mammals, anthropogenic noise pollution in the St. Lawrence Estuary and Saguenay River can lead to the degradation of the beluga whale critical habitat, making it a major issue limiting their recovery (Chion *et al.*, 2020). Research conducted under the recovery strategy by Fisheries and Oceans Canada has led to a better understanding of the characteristics of the vessel fleet and the vessels most likely to disrupt normal beluga whale behaviour (Fisheries and Oceans Canada, 2017). The potential for disturbance stems from:

- Noise emissions from vessels (for example, container ships), the number of transit they represent (for example, ferries), or their location (overlap with important female and calf habitats); and
- Acoustic overlap of sound emissions with echolocation or beluga communication frequency bands (for example, whale watching vessels).

The Fisheries and Oceans Canada review found that merchant vessel traffic exposes a significant proportion of the beluga population "to noise levels that can cause negative responses many times a day, with the vast majority of exposed animals being females with calves or young" (Lesage *et al.,* 2014b). Studies also indicate that ferries and other large vessels can reduce beluga whale acoustic habitat to a fraction of what it would occupy under natural conditions (Gervaise *et al.,* 2012), and that the noisiest areas are along the north shore of the St. Lawrence River and at the mouth of the Saguenay River, while quieter areas are along the south shore and in the Upper Estuary (McQuinn *et al.,* 2011; Lesage *et al.,* 2014a; Roy and Simard 2016)."

Currently, it is estimated that the population numbers only about 900 individuals. The recovery objective for the beluga is to reach a population of 7,070 individuals, which is seven times more than now (Fisheries and Oceans Canada, 2012). Since the beginning of the 2000s, a decline in the population of about 1% per year has been observed. According to Fisheries and Oceans Canada, the recovery plan objective can only be achieved if the habitat currently occupied by the species is expanded and areas used in the past are recolonized. Any increase in human pressure in this portion of the habitat poses an increased risk to the recovery of the population.

Key information on the initial design of the vessels to be built as part of the Project is considered insufficient to allow clear conclusions to be drawn regarding their effectiveness as a mitigation measure to reduce underwater noise at the source. Furthermore, if the results of ongoing studies or follow-ups carried out by the Proponent demonstrate that vessel noise does indeed have a significant negative effect on beluga whales, there is currently no contingency plan. In fact, the Proponent does not mention any additional measures that would further mitigate the effects of marine shipping on marine mammals and the beluga in particular. In light of current knowledge, the level of uncertainty regarding the assessment of underwater noise, and the lack of information on the precise mechanisms through which anthropogenic noise affects beluga whales, it cannot be ruled out that the direct effects of the Project related to increased marine shipping in Saguenay River pose an increased risk to the beluga whale population.

As mentioned by Parks Canada, the precautionary principle[38] should prevail for all estimates related to the status of the beluga and the effects that the Project could potentially have on the species. The Rapport des premières constatations et recommandations du programme de recherche sur la modélisation du trafic maritime et des déplacements des baleines dans l'estuaire du Saint-Laurent et le Saguenay en vue de la réduction des impacts du déploiement de la Stratégie maritime du Québec sur l'exposition des bélugas au bruit sous-marin de la navigation (2018-2023) (in French only), directed by Professor Chion of the Department of Natural Sciences at the Université du Québec en Outaouais, makes the same findings (Chion *et al.*, 2019).

The marine traffic associated with the Project could increase disturbance and the risk of injury and collision, particularly for the blue whale and fin whale in the St. Lawrence Estuary. The application of voluntary speed reduction measures that are already in effect in the sector and that the Proponent undertakes to respect should, however, make it possible to reduce the risk of collision with large whales. Moreover, the overlap between the noise added by the Project vessels and these species would be located in a currently busy navigation zone of the estuary where the effect on silent periods would be less significant than in Saguenay River. Thus, the likelihood that marine shipping associated with the Project would generate significant adverse effects on fin and blue whales is low.

Cumulative Effects

Marine mammals in the St. Lawrence River Estuary, including beluga whales, have been chronically exposed to noise from merchant ships for many years. This is in addition to the tens of thousands of transits made by the five ferry lines that operate in the beluga's summer habitat and the hundreds of transits caused by the daily departures of the marine mammal-watching industry and recreational boaters who navigate in the sector. There is no overall picture characterizing underwater noise in beluga critical habitat. However, analyses of noise levels in some areas have shown that ambient noise levels are relatively consistent within the habitat, with the exception of:

- Some areas that are still not very noisy, such as the Saguenay River and the habitats south of the central islands of the estuary; and
- Certain sectors with high noise levels, such as the navigation corridors in the Laurentian Channel in the Lower Estuary and the North Channel in the Lower Estuary, as well as the mouth of the Saguenay River.

As an example, chronic exposure of belugas to noise at the mouth of the Saguenay River, currently reduces the communication space between beluga whales to 30% of what would prevail without the presence of vessels half of the time and 15% of the time (Gervaise *et al.*, 2012). Although a quantitative analysis of the likely effects of this reduction in beluga acoustic space could not be completed as part of the Science Response 2018/025, Fisheries and Oceans Canada assumes that such a sustained level of traffic would result in lost opportunities for beluga whales. In contrast, the presence of habitats that are highly frequented

[38] The Precautionary Principle was enacted at the Rio Conference on Biological Diversity (1992), which states that "where there are threats of serious or irreversible damage, lack of full certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation..."

by beluga whales and are not very noisy, as is currently the case for the Saguenay River, provides marine mammals with spatial and temporal windows to effectively carry out their activities.

Overall, there is no evidence that beluga whale interactions with vessels or the volume of traffic (merchant vessels, recreational boats, whale-watching boats) in its habitat have decreased since the species was listed under the *Species at Risk Act*. The review of the effectiveness of recovery actions for the St. Lawrence Estuary beluga whale concludes that, collectively, recovery actions implemented following the first recovery plan and those implemented after the species was listed under the *Species at Risk Act* have not been successful in reducing threats sufficiently to allow for population growth and recovery (Fisheries and Oceans Canada, 2017).

Conclusion

The direct and cumulative effects of the Project on marine mammals, particularly beluga whales, were raised as an issue in the majority of comments received from the public, various organizations and First Nations. The latter stressed that the government should wait for the results of scientific research on the effects of underwater noise on beluga whales, particularly those funded by the Government of Canada under the Oceans Protection Plan, before authorizing an increase in commercial shipping on the Saguenay River. In particular, Stratégies Saint-Laurent[39] mentions that it would be wise to include marine development in a vast consultation process covering the entire St. Lawrence before the Project is evaluated. This voice is also shared by the Innu First Nation of the Pessamiulnutsh, which mentioned in its submission that a fundamental precautionary principle must guide decisions regarding species at risk.

The Agency considers that the Project is likely to cause significant adverse environmental effects, both direct and cumulative, on marine mammals and, in particular, the beluga population, despite the consideration of key mitigation measures detailed below. The Project would double the amount of vessel traffic in the Saguenay River, within a protected area, which is a relatively quiet portion of critical beluga whale habitat, used by females and calves. The increase in vessel traffic in the Saguenay River and St. Lawrence Estuary would contribute to the degradation of the underwater acoustic environment, which would be contrary to the objectives of the actions plans and recovery programs for marine mammals at risk in the St. Lawrence Estuary as well as the protection mandate of the protection area.

With the application of the key mitigation measures outlined below, the Agency considers that the level of residual direct and cumulative effects of the Project on beluga whales would be high. The Agency's assessment is based on the environmental effects assessment criteria in Appendix A and the following findings:

- The magnitude of Project effects would be high since:
  - The effects of underwater noise could jeopardize the recovery of the St. Lawrence beluga population;
- The Project would result in a change to acoustic environment of the critical habitat over the life of the Project. This change would therefore be regional and long-term;

[39] Stratégies Saint-Laurent, July 2019. Stratégies Saint-Laurent's notice on the Énergie Saguenay project (LNG Port) submitted to the Canadian Environmental Assessment Agency (CEAA), 16p.

- Since this change is related to the effects of navigation, it would be reversible and intermittent in time, the period when the noise is produced and perceived by individuals would take place in the presence of ships only.

Determination of Key Mitigation Measures

The Agency has identified key measures that would help reduce effects on marine mammals. However, these measures would not mitigate the residual effects sufficiently to render them insignificant. In determining the key mitigation measures, the Agency considered the mitigation measures proposed by the Proponent, the advice of government authorities, and the comments received from consulted First Nations and the public:

- Drilling with rotary heads and pile driving by vibration to minimize noise;
- Develop and implement phased start-up procedures, gradually increasing the power of the drilling and pile-driving equipment, for drilling and pile-driving activities to allow marine mammals to move away from sources of underwater noise;
- Develop, prior to the commencement of marine construction and in consultation with Fisheries and Oceans Canada, and implement measures to ensure that beluga whales (*Delphinapterus leucas*), harbour seals (*Phoca vitulina*) and fish are not exposed to levels of noise that may cause environmental effects on these species during construction in and around the marine environment, including mortality and behavioural effects. Establish, prior to marine construction, underwater noise thresholds above which beluga whales, harbour seals, and fish should not be exposed during construction in and near the marine environment. In establishing these thresholds, consider the work methods used, the underwater noise levels expected for each of the construction activities in and near the marine environment, and the times of the year during which these activities will occur. Notify the Agency, prior to marine construction, of these measures and the circumstances during which each exposure level is to be maintained and implement these measures throughout the duration of the marine construction unless otherwise authorized by Fisheries and Oceans Canada;
- Develop, prior to the commencement of marine construction and in consultation with Fisheries and Oceans Canada and interested First Nations, and implement throughout the marine construction phase a monitoring program for beluga and harbour seals. As part of the monitoring program:
  - Install buoys to define marine mammal protection zones;
  - Require observers, who are qualified marine mammal watchers, to conduct continuous visual surveillance of the protected areas during daylight hours and report to the Proponent the presence of beluga whales or harbour seals within their respective protected areas during each marine construction activity;
  - Stop or postpone the start of marine construction activities if a beluga or harbour seal is observed in the marine mammal observer protection areas until the beluga or seal has exited the protection area and no beluga or harbour seal is observed in the protection area for a continuous period of at least 30 minutes;
  - Do not bother or harass belugas or harbour seals in any way to make them leave the protected areas;

- Perform drilling and pile driving activities only during daylight hours and avoid low visibility conditions (including fog).

- In order to limit collisions with marine mammals, maintain the speed of tankers and escort vessels below ten knots between Les Escoumins and the Project site and below 8 knots in the Grosse-Île sector (Île Saint-Louis), as long as the safety of the vessel and its crews is not compromised. In order to meet the need for an adaptive approach, this measure will have to be reviewed annually based on the results of the follow-ups, and the most recent scientific data acquired, in consultation with stakeholders and using existing work platforms;
- Develop, prior to operation and in consultation with Fisheries and Oceans Canada, Parks Canada and Transport Canada, and implement, upon commencement of operation, a Marine Mammal Management Plan to maximize the mitigation of environmental effects of shipping associated with the Project caused by underwater noise and the risk of collisions with marine mammals. As part of the development of the plan, determine the frequency with which the plan will be reviewed and, if necessary, updated in consultation with Fisheries and Oceans Canada, Parks Canada and Transport Canada. As part of each plan review:
  - Identify complementary underwater noise and collision risk reduction technologies and operational practices applicable to the Project, including emerging technologies and practices at a sufficiently advanced stage of technological development to become technically and economically feasible during the life of the project;
  - Determine how and when each identified technically and economically feasible technology or operational practice will be implemented during;
  - Establish underwater noise and collision risk reduction goals, including noise thresholds in certain frequency bands not to be exceeded for the types of tankers associated with the designated project, for specific intervals that reflect how the Proponent plans to implement the technologies and operational practices;
  - Identify barriers, challenges, and risks associated with the implementation of technologies and operational practices and identify how to overcome them;
  - Submit any revised plan to the Agency, Fisheries and Oceans Canada, Parks Canada and Transport Canada within 30 days of the update;
  - Report annually on progress in implementing the current version of the Marine Mammal Management Plan, including the achievement of underwater noise and collision risk reduction targets.
- Develop, in cooperation with Fisheries and Oceans Canada, Parks Canada and Transport Canada, and implement any economically viable time-allocation approach to minimize acoustic disturbance to marine mammals, provided that the safety of the vessel and its crew is never compromised;
- Participate, at the request of the relevant authorities, in regional initiatives related to the monitoring, assessment or management of cumulative adverse effects on beluga whales associated with commercial vessel traffic on the Saguenay River, should such initiative(s) occur during the construction or operation of the Project. Implement any technically and economically feasible mitigation measures or

follow-up programs identified through any of the regional initiatives described above that are under the responsibility of the Proponent.

Need for Follow-up and Follow-up Requirements

To verify the prediction of effects on marine mammals, including species at risk, and the effectiveness of proposed mitigation measures, the Agency recommends that the follow-up program include the following requirements:

- Develop a follow-up program prior to construction, in consultation with First Nations, Fisheries and Oceans Canada, Parks Canada and Transport Canada to verify the accuracy of the environmental assessment and to assess the effectiveness of mitigation measures with respect to the environmental effects of the risk of collision with marine mammals. Implement the follow-up program during operation. As part of the follow-up program:
  - Discuss, during program development, opportunities for First Nations to participate in the implementation of the program, including participation in marine mammal observations, and allow for the participation of any interested First Nations;
  - Require observers, who are qualified marine mammal watchers and who are positioned on board the tankers associated with the Project, to conduct continuous visual monitoring of marine mammals during daytime navigation periods.
- Develop, prior to the commencement of marine construction activities and in consultation with interested First Nations and Fisheries and Oceans Canada, 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 underwater noise on fish and marine mammals. Implement the follow-up program during construction and operation. As part of the implementation of the follow-up program:
  - Conduct real-time monitoring of underwater noise levels from drilling and pile driving activities during the first 14 days of construction to validate the results of acoustic simulations performed for these activities during the environmental assessment and adjust the exclusion zone distance or mitigation measures, if necessary. Determine, in consultation with parties consulted in the development of the follow-up program and based on the results of the monitoring, whether additional monitoring is required beyond the first 14 days of construction. If additional monitoring is required, update the monitoring program and implement the additional monitoring program requirements;
  - Carry out a follow-up of the underwater noise levels emitted by the docking and loading operations as well as those related to the transportation of liquefied natural gas during the operational phase of the Project at the marine infrastructure site. The monitoring will have to evaluate the underwater noise during the entire period required to dock and load a vessel;
  - Carry out a follow-up of the underwater noise levels related to the transportation of liquefied natural gas, including tankers and tugs, during the operational phase of the Project. The follow-up will have to allow the evaluation of the underwater noise for different conditions, in particular during the descent and ascent of the Saguenay River. It should also cover the St. Lawrence Estuary. The monitoring will have to target beluga, harbour seals and endangered whales. The monitoring should make it possible to measure the noise actually generated by the vessels and the exposure of the

mammals to the noise, taking into account their use of the various habitats (feeding, breeding, etc.) in the affected sector and their level of loyalty to them. Should the results of the follow-up show that the underwater noise emitted by navigation exceeds the forecasts presented in the impact study, the Proponent shall adapt, navigation in order to minimize the effects on the species according to methods that could be identified in collaboration with the competent authorities and the First Nations who will demonstrate their interest.

5.3 Fish and Fish Habitat, Including Invertebrates, Species at Risk and Marine Plants

The Project could result in residual effects on fish and fish habitat due to fish habitat destruction and change, as well as changes to water quality and the underwater noise environment. However, the Agency considers that these effects are not likely to be significant, taking into consideration the implementation of the mitigation and follow-up measures recommended in Section 5.3.2 and the implementation of compensation programs. To determine the significance of the effects on fish and fish habitat, the Agency has assessed, in particular, whether these effects could hinder the progress of one or more key phases of the fish lifecycle, maintenance of fish populations or maintenance, management or recovery of fish species at risk.

5.3.1 Analysis of Potential Effects and Proposed Mitigation Measures

Description of the Component

The Agency's analysis considers fish[40] and fish habitat[41] as defined in the *Fisheries Act*, benthic fauna[42], fish and benthic species listed in Schedule 1 of the *Species at Risk Act,* and species for which the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) recommends a status under the *Species at Risk Act*[43].

[40] Fish includes parts of fish, shellfish, crustaceans, marine animals and any parts of shellfish, crustaceans or marine animals, and the eggs, sperm, spawn, larvae, spat and juvenile stages of fish, shellfish, crustaceans and marine animals. However, marine mammals are listed in Section 5.2.

[41] Fish habitat means water frequented by fish and any other areas on which fish depend directly or indirectly to carry out their life processes, including spawning sites and nurseries, rearing, food supply and migration areas.

[42] Benthic species means bottom-dwelling animals.

[43] Only species at risk under the *Species at Risk Act* are presented here. According to information provided by the Proponent, one species with special status (provincial only), the American shad, might also be present in the Saguenay-Lac-Saint-Jean region. This species has been assessed with under the Quebec Government's environmental assessment process for the Project.

Fish Species and their Habitat – Freshwater

Ten watercourses or sections of watercourses cross the restricted study area; five are permanent and five are intermittent (WSP, January 2019). The potential fish habitat in these watercourses is considered null or very low by the Proponent, particularly due to insurmountable barriers. No spawning sites were identified in the sector. The only watercourses that would be of potential interest for fish are CE-01 and CE-02 (WSP, January 2019). Electrofishing was performed in these two watercourses. Eight Brook trout were captured and eight other specimens were observed, in the downstream portion of watercourse CE-01 only (outside the restricted study area).

Regarding the quality of groundwater, Environment and Climate Change Canada is of the opinion that the Proponent's piezometric map is incomplete for the southern and eastern zones of the study area. It recommends that the Proponent drill additional wells at the beginning of the construction phase in order to complete the piezometric map and learn about the groundwater flow pattern throughout the restricted study area.

Fish Species and their Habitat – Saltwater

The Saguenay River accommodates between 70 and 80 fish species, some of which are freshwater[44] and primarily use the top 20 metres from the surface of the water column, while others are saltwater and use deep waters more (WSP, January 2019). Wolffish (Atlantic, Northern and Spotted), Deepwater redfish, Greenland shark, Thorny skate and Smooth skate in the Saguenay River are evidence of the unique biophysical characteristics of the Saguenay River.

Regarding benthic habitats[45], the zone near the marine infrastructure offers three distinct types of habitats, i.e., a rocky underwater cliff rich in biodiversity and concentrations of organisms suitable for feeding of fish (eastern sector), a coarse substrate with a medium slope bounded by muddier mudflats, offering a few aquatic grass bed areas hospitable to ichthyofauna at high tide (nursery, feeding, rest, shelter) (western sector), and then a poorer deepwater habitat, characterized by a shallow-sloping soft bottom, but suitable for feeding of certain bottom fish species and incubation of eggs for certain oviparous species (deepwater sector) (WSP, January 2019 and January 2020).

The open water zone of these three sectors serves for the movements of various pelagic or migratory species, including Atlantic herring, Atlantic salmon, anadromous Brook trout, Striped bass, Rainbow smelt and American eel (WSP, January 2020). It is unlikely that capelin use the Project sector for spawning due to the low proportion of soft substrate expanses (WSP, January 2020).

In the context of the Project’s characterization work, approximately 110 fish observations were made, including lycodes, flatfish, rays, elongated fish, and others that may be likened to Redfish. The observations were made on the videographic sequences of habitat characterization and use of the environment by benthic fauna, at depths fluctuating between 50 and 100 metres. No targeted fish inventory was conducted by the

[44] Freshwater species are said to be animal and plant species that live exclusively or primarily in freshwater, as opposed to saltwater species.
[45] Includes the surface of the sediment and certain layers of the subsoil.

Proponent. The Huron-Wendat Nation deplored the fact that the marine sector was not the object of targeted sampling, due to the high spatiotemporal variability mentioned by the Proponent, and considers that the seine and mesh net drifting egg inventories should have been conducted. It considers that the absence of such an inventory affects the type of compensation Project that would be proposed (Conseil de la Nation huronne-wendat, June 2019). However, Fisheries and Oceans Canada considers that the baseline status of fish populations has been satisfactorily described and that it has sufficient information to assess the species and habitat functions affected by the Project in the construction phase (Fisheries and Oceans Canada, 2021).

The fish species at risk likely to be affected in the context of this Project are presented in Table 14.

Table 14: Fish species at risk present or potentially present in the Saguenay River

Species		Status	
Common name	Scientific name	SARA (Schedule 1)	COSEWIC
American eel	*Anguilla rostrata*	Not listed[46]	Threatened
Striped bass	*Morone saxatilis*	Extinct	Endangered
Atlantic sturgeon	*Acipenser oxyrinchus*	Not listed[45]	Threatened
Lumpfish	*Cyclopterus lumpus*	Not listed[45]	Threatened
Atlantic wolffish	*Anarhichas lupus*	Special concern	Special concern
Northern wolffish	*Anarhichas denticulatus*	Threatened	Threatened
Spotted wolffish	*Anarhichas minor*	Threatened	Threatened
Atlantic cod	*Gadus morhua*	Not listed[45]	Endangered
Thorny skate	*Amblyraja radiata*	Not listed[45]	Special concern
Smooth skate	*Malacoraja senta*	Not listed[45]	Special concern
Atlantic Salmon	*Salmo salar*	Not listed[45]	Special concern
Acadian redfish	*Sebastes fasciatus*	Not listed[45]	Threatened
Deepwater redfish	*Sebastes mentella*	Not listed[45]	Endangered

[46] Under review for the purposes of an addition.

Marine Vegetation and Aquatic Grass Beds

The mediolittoral vegetation[47] of this sector of the Saguenay River would be most often dominated by the presence of bulrushes, spartina, rush and sedge groupings. Six intertidal grass beds[48] were identified near the Project site during field inventories conducted in 2016, including three presenting an area of less than one square metre (WSP, January 2019). The three main intertidal grass beds were composed of Baltic rushes, with respective areas of 1,479 square metres (H3), 303 square metres (H1) and 34 square metres (H2). The aquatic grass beds are habitats conducive to breeding, nursery, feeding and rest purposes for certain fish species (WSP, January 2020).

Depending on the type of environment and the geographic region, the Proponent does not identify any marine plant species at risk under the *Species at Risk Act* in the study area.[49]

Benthic Fauna

In the freshwater environment, the watercourses inventoried in the study area would be poor in benthic organisms in terms of abundance and diversity. Watercourse CE-02 is the one that would present the greatest abundance of organisms (WSP, January 2019).

In the marine environment, the presence of many suspension feeder species[50] is evidence of the richness of particles and microorganisms in the water column, near the seabed (WSP, January 2019).

In the context of the September 2016 fieldwork, no epibenthic organism[51] was found in the intertidal zone of the sector near the Project. The available habitats are mainly rocky and the zone is relatively narrow, making it an inhospitable environment for epibenthic fauna.

In the subtidal zone[52], barnacles and some sea urchins were observed. However, the deepwater layer is highly diversified. Sponges, anemones and hydrozoans, as well as certain echinoderm species are mainly found there.

[47] Qualifies the littoral zone between the mudflats of the medium tides.
[48] Intertidal: Zone between the high tide and low tide levels.
[49] Seven species identified under the Quebec *Act respecting threatened or vulnerable species* could be present, however. They are all likely to be designated as threatened or vulnerable under the *Act respecting threatened or vulnerable species.* These species are Tuckerman's quillwort (*Isoetes tuckermanii*), Northern stickseed (*Hackelia deflexa*), Robinson's hawkweed (*Hieracium robinsonii*), Woolly beach-heath (*Hudsonia tomentosa*), Rayless mountain groundsel (*Packera indecora*), Marsh lousewort (*Pedicularis palustris*) and Obedient plant (*Physostegia virginiana*). Those species has been assessed with under the Quebec government's environmental assessment process.
[50] Organism which collects food by filtering the environment with nets or any external mechanism allowing collection of particulate or planktonic food and food suspended in water.
[51] Organism living on the surface of the substrate in the benthic zone, without being a burrowing organism.
[52] Littoral zone located below low water mean tide.

Among the epibenthic invertebrate species likely to be found on the site or near the marine infrastructure, four main groups or species at considered of special interest, i.e., coldwater sponges and corals[53], snow crab (*Chionoecetes opilio*)[54], and shrimp and *Sclerocrangon ferox* (a shrimp species associated with Arctic waters).

Softshell clam beds were found at some locations in the Saguenay River and the St. Lawrence Estuary, particularly in Tadoussac Bay and Baie Sainte-Catherine, and in Anse Saint-Jean and Anse Saint-Étienne. The green sea urchin (*Strongylocentrotus droebachiensis*) would be omnipresent in the top 15 metres below the lower low water large tide on the rocky escarpments (WSP, January 2019).

Potential Effects

Potential Effects on Fish in the Freshwater Environment

Watercourse CE-03 would be directly affected by the Project and by the development of permanent areas that would require a section of 680 metres (WSP, January 2019). The Proponent provides for the relocation of this section to maintain the flow of water between nameless lake 2 and the downstream section of the watercourse (WSP, January 2019). However, this watercourse was not identified as a fish habitat.

Fish are only present in watercourse CE-01, downstream from the sill impassable for fish, located at Chemin du Quai-Marcel-Dionne. Initial site preparation could increase suspended solids emissions on a limited basis in the freshwater habitat. The development of the different watercourse crossings could generate suspended solids emissions, which could disturb the surface water quality and thus, the fish habitat of watercourse CE-01 downstream from the work.

According to Fisheries and Oceans Canada's opinion, fishing carried out in the freshwater tributaries of the Saguenay River that would be affected by the Project has confirmed the absence of fish. Thus, the habitat likely to be affected is located entirely in the marine environment, i.e., in the Saguenay River below the limit of the upper high water mark.

The relocation and the effects of the Project on the watercourses are a source of concern for the Pekuakamiulnuatsh First Nation, for whom the aquatic ecosystem is not limited to fish habitat, but also includes benthic fauna [lake without fish], herpetofauna, migratory bird nesting habitat, etc. (Pekuakamiulnuatsh Takuhikan, 2019.)

[53] Coldwater sponges and corals were observed in low density during characterization.
[54] For the benthic community of the deepwater zone of the Saguenay River, a snow crab population is present.

Potential Effects on Fish in the Marine Environment

Encroachment

The main effect on fish habitat is permanent encroachment by the marine infrastructure. The area that would be destroyed is estimated at 243 square metres. This habitat would be used by fish for movements (migration) or for feeding (WSP, January 2019).

Disturbance

Construction of marine infrastructure should not induce a significant geomorphological and hydrological change, but the development of piles and walls could result in countercurrents, and sedimentation could be observed behind them or near the wharves (WSP, January 2019 and 2020).

Alteration of the habitat by development of a wharf on piles and its shading can reduce the success of predation and affect the feeding of individuals (WSP, January 2020). Movement or migration corridors used by certain species of interest, particularly Atlantic salmon, anadromous Brook trout, Rainbow smelt, Capelin, Atlantic sturgeon and American eel, could be displaced due to the presence of loading platforms and walls. However, Fisheries and Oceans Canada points out that the fish species using the area are adapted to the natural variability of current conditions and that no significant impact on fish migration in the area is anticipated as a result of the effects that the construction of the terminal could generate (Fisheries and Oceans Canada, 2021).

Considering that the eastern portion of the marine infrastructure implementation zone corresponds to the characteristics of the Atlantic wolffish spawning habitat, the noise and vibrations in the water could cause a disturbance for the species. However, the density of individuals in the Saguenay River is unknown according to the scientific documentation consulted by the Proponent and it is difficult to estimate the number of individuals likely to be affected. In the operation phase, the propulsion of ships or tugboats could cause sudden changes in currents near the wharves. Effects could be felt in the zone of the underwater cliff, where sectors hospitable to the Atlantic wolffish could be present. Hatching of the eggs could be affected if the currents became too strong (WSP, December 2020). However, Fisheries and Oceans Canada states that no species at risk are likely to be affected by construction and operation activities at the terminal site (Fisheries and Oceans Canada, 2021).

Luminosity

The presence of light in an aquatic ecosystem may result in different effects on the aquatic communities. Artificial light masks the natural rhythm of moonlight, which is a determinant for the progress of the biological processes of several marine species (WSP, January 2020). The Proponent estimates that the fish species would be little affected, because light would not be projected directly at the water, that the lighting level in the sector would be low, and that the high natural turbidity limits light penetration (WSP, January 2019 and January 2020).

The possible reactions, in the case of capelin migration in the axis of the marine terminal platforms, are the alteration of its migratory trajectory line, the separation of the bank on both sides of the structure, the stoppage of migration while waiting for adequate luminosity or current conditions, or the use of increased turbidity as protection shelter against predators. In general, although the structure may constitute a partial barrier, migrating fish will probably cross it more often without migratory consequences (WSP, December 2020).

Suspended solids

Regarding the emission of suspended solids during drilling and vibro-sinking work, it would be unlikely to induce an effect on fish and fish habitats. The suspended solids emitted during work due to crumbling of the natural rock would be free of contaminants and quickly dispersed in the Saguenay River. However, it is important to mention that the suspended solids can interfere with the biological activities of the fish, primarily breathing.

Underwater noise

The drilling and vibro-sinking work is likely to generate underwater noise. However, no rock blasting is foreseen in the marine environment. The drilling necessary for deployment of piles and vibro-sinking of piles should each require approximately 2,360 hours (WSP, January 2019).

According to the Proponent's estimates, the noise from drilling the pile sockets would be below the proposed safety threshold at all times. However, the noise generated by vibro-drilling of piles could turn out to be harmful for fish weighing under 2 grams up to a distance of 2.6 kilometres. Certain fish could suffer stress, avoid or flee the zone near the work due to disturbance by noise, or suffer the effects of masking[55] of biologically significant sounds due to anthropogenic noises emitted at similar frequencies. The effects of noise on eggs and larvae may be manifested, in particular, by an increase in the mortality rate, an increase in the malformation rate in larvae, a decrease in the growth rate and loss of efficiency in avoidance of predators (WSP, January 2020).

Fisheries and Oceans Canada points out that little data currently exists on the effects of underwater noise on fish behaviour. Uncertainty therefore remains regarding the effects of noise generated by construction and operation of the terminal (transit, berthing and moored ships) on fish behaviour in the sector. Avoidance of the sector or a loss of functions associated with nearby habitats cannot be excluded completely, particularly concerning Rainbow smelt larvae, for which the sector of the Saguenay River near the projected terminal would correspond to a larval retention zone. The Pekuakamiulnatsh First Nation says it is especially concerned about the effects of noise on the entire food chain.

However, few effects are expected on fish in relation to navigation in the Saguenay–St. Lawrence Marine Park due to the short exposure time (WSP, January 2019). In general, invertebrates and fish are more sensitive to the pressures induced by high noise levels, such as explosions or drilling or vibro-sinking activities.

[55] The effects of masking can affect communication between individuals, the search for food or detection of predators.

In the case of the species at risk present in the Saguenay River, the increase in marine traffic could constitute an additional pressure, particularly in the case of the American eel passing through the Saguenay River to get to the freshwater habitats. Certain studies tend to show that noise would make the eels more vulnerable to predators. Atlantic wolffish and Northern wolffish larvae could also suffer effects linked to navigation. American shad eggs could also be subject to the influence of the rising noise level resulting from the increase in navigation, because they are found in meroplankton.

Water and soil quality

The presence of additional tankers from abroad in the waters of the Saguenay River could increase contamination of the water and the risk of introduction of invasive alien species. Some citizens and organizations are particularly concerned about the release of ballast water[56] and its effect on the biodiversity of the Saguenay River. The Essipiunnuat First Nation also raised this issue, in relation to the addition of ballast water from ships related to the Project to the ballast water generated by existing or expected marine traffic in the region (Innu Essipit First Nation Council, 2019). Fisheries and Oceans Canada also assesses that the increase in the number of ships and the quantity of ballast water discharged into the Saguenay River could increase the risk of introducing aquatic invasive species, particularly by international ships that come from regions with environmental conditions similar to those prevailing in the Saguenay River. Uncertainty remains in this regard due to the significantly varying salinity conditions in the sector (Fisheries and Oceans Canada, 2021).

Although the discharge of oily water is prohibited in the Saguenay River, a spill could occur accidentally and affect the quality of the water and the health of marine organisms. Certain sensitive habitats of importance to fish are present in the area of the proposed terminal and along the route that ships would take between the latter and Les Escoumins. For instance, coastal habitats, including aquatic grass beds, which are of interest for food and rearing for several species of fish, would be particularly vulnerable to the consequences of a spill of harmful substances. Section 6.1 – Effects of Accidents and Malfunctions addresses this aspect.

With respect to groundwater, Environment and Climate Change Canada believes that road maintenance activities (dust suppression and de-icing agents) during the construction phase could have a negative effect. Blasting could also result in the migration of nitrogenous products and other contaminants contained in the explosives used into groundwater.

Potential Effects on Marine Vegetation and the Intertidal Grass Beds

The construction of marine infrastructure, and more specifically the pipes that feed the two platforms and their supports, would encroach on the littoral zone and intertidal grass beds H1, H2, H4, H5 and H6 (Figures 8 and 9), which total 340 square metres of low-to-medium-density grass beds. Permanent encroachment on the grass beds would be around 14 square metres per pillar (2) and the temporary disturbance would be 293 square metres (zone 10 metres wide around the infrastructure to be built; WSP, January 2019). The permanent total loss of marine vegetation and intertidal grass beds would be around

[56] The term “ballast water” refers to water and suspended solids taken aboard a ship to control the ship’s stability. In general, it must be expected that various bacteria or other microbial organisms, microalgae, aquatic plants and animal species (crustaceans, shellfish, fish, etc.) will be found in ballast water.

50 to 75 square metres. However, the Project would not encroach on grassland H3, which covers an area of 1 479 square metres.

Regarding suspended solids emissions during drilling and vibro-sinking work, the Proponent mentions that it should not induce significant effects on intertidal vegetation due to the current to which the intervention zone is subjected. However, the countercurrents created by the presence of platforms could alter the habitats of the intertidal zone, particularly the grass beds. Fisheries and Oceans Canada assesses that the installation of the platforms could damage or destroy certain aquatic grass beds located in the terminal area, by modifying the hydrosedimentary dynamics of the area. The H1 and H2 grass beds are highly likely to be affected because of their proximity to the proposed terminal. The habitat conditions of grass bed H3 could be affected, but to a lesser extent (Fisheries and Oceans Canada, 2021).

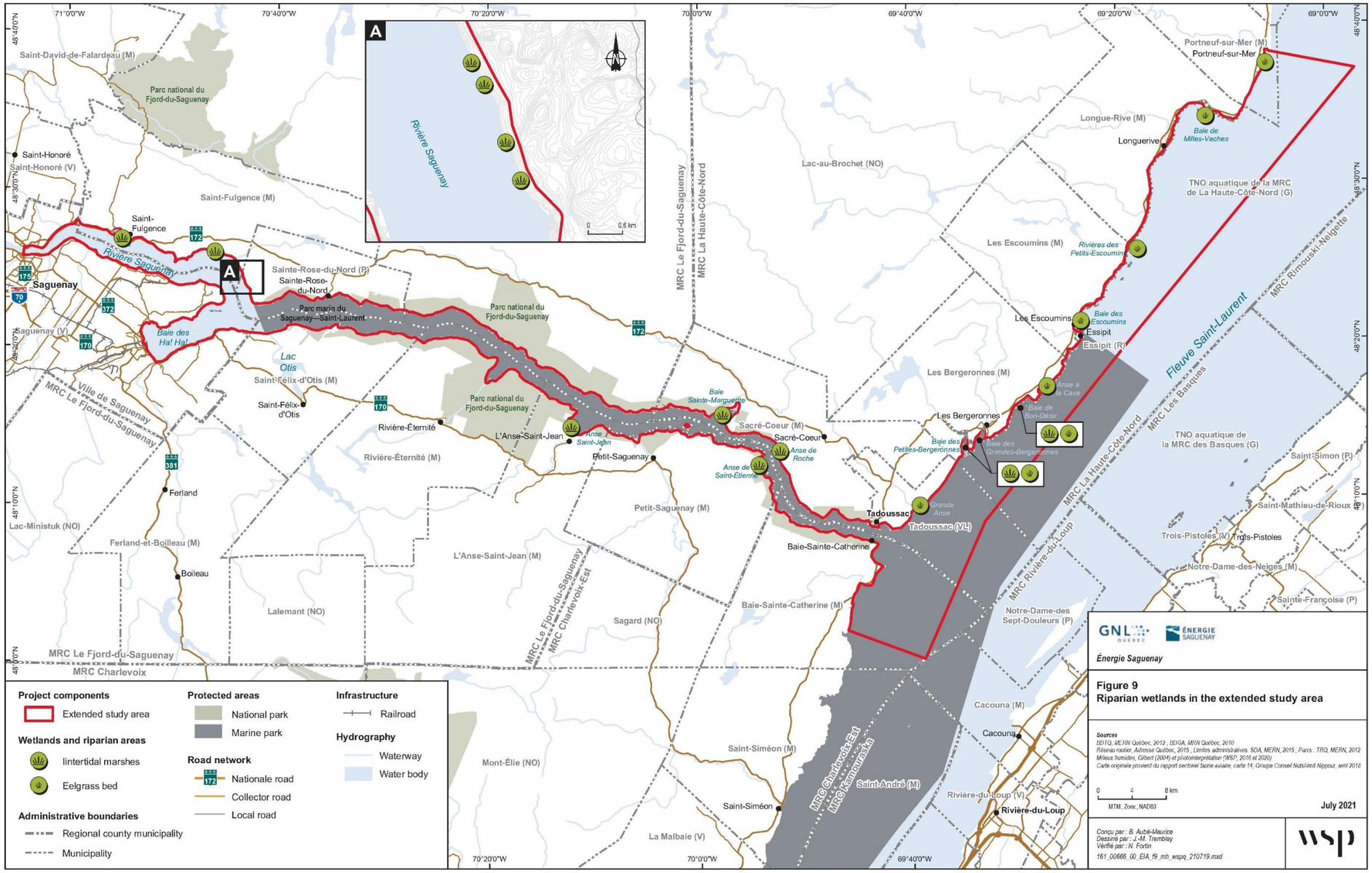
In the operation phase, except for possible accidents and malfunctions, the Proponent does not anticipate effects on marine vegetation. The Proponent mentions that the slowing of the currents near the shore could be beneficial regarding the presence of aquatic grass beds. Nonetheless, it specifies that erosion resulting from wave action[57] caused by navigation could disturb the littoral habitats all along the Saguenay River. However, because the shores of the Saguenay River are mostly rocky, little vegetation and few grass beds are identified. For the estuary, the riparian wetlands are found far from the shipping channel, generally several kilometres away. In both cases, commercial navigation would not be considered a significant factor in shore erosion (WSP, January 2019 and WSP, June 2020).

[57] All of the waves produced by the wake of the boats and that break against the shores result in their degradation.

Figure 8: Seagrass beds, wetlands and vegetation types present and aquatic habitat at the Project site

Source: WSP, July 2021

Figure 9: Grass beds and wetlands present in the extended study area



Source: WSP, July 2021

Potential Effects on Benthic Fauna

As discussed in the section on effects on fish in the freshwater environment, the development of permanent areas would necessitate encroachment on the water environment and could also increase suspended solids emissions (WSP, January 2019). Certain activities could also generate accidental spills.

In the marine environment, an encroachment of approximately 30.5 square metres would be caused by the footprint of the marine infrastructure in the zone colonized by benthic invertebrates. The Proponent specifies that the Project's effect on the most sensitive environments and the coldwater sponge and coral concentration zones would be limited, because they are found at greater depths. Mortality could occur in the event of the presence of non-mobile organisms directly in the work area.

The noise disturbance could also affect certain organisms. Pelagic molluscs, particularly squid and octopus, could show signs of disturbance (rising to the surface or avoidance behaviour), alert behaviours and startle effects.

Finally, suspended solids could interfere with certain coldwater sponge and coral activities, such as feeding and breathing. The Proponent mentions that, although it considers it unlikely that suspended solids have an effect on these invertebrates, it is undesirable that these materials reach the environment (WSP, January 2019).

Mitigation and Follow-up Measures Planned by the Proponent

The Proponent mentions that its Project has been optimized to minimize direct encroachment on fish habitat. The transshipment platforms chosen should minimize encroachments on the seabed and the littoral zone because their components would be supported by piles.

To mitigate the Project's effects on fish and fish habitat, including benthic fauna and species at risk, the Proponent proposes several mitigation measures, particularly: the delimitation of work areas to avoid non-required encroachments on fish habitat, restoration of riparian strips deteriorated by the work, performance of certain construction activities near shores, respect for natural drainage and maintenance of the natural flow of watercourses during the work.

The Proponent undertakes to offset direct encroachment of infrastructure on fish habitat (243 square metres), as prescribed by the *Fisheries Act*. This encroachment concerns benthic invertebrates (30.5 square metres) and aquatic vegetation and intertidal grass beds (50 to 75 square metres). The compensation Project chosen must be discussed and developed according to Fisheries and Oceans Canada guidance at the regulatory phase. The Proponent also considers that its Project creates a form of self-offsetting for benthic organisms, because these organisms eventually could cover the piles at their base. The Huron-Wendat Nation questions this form of self-offsetting and questions what species will really be favoured by the presence of piles. Fisheries and Oceans Canada also points out that the response of the different benthic and pelagic species to the effects of shading and alteration of the currents may vary greatly.

Moreover, the Huron-Wendat Nation contested the Proponent's proposals with the aim of minimizing the effects on fish and fish habitat and which would not account for the most important environments to safeguard, given the encroachment on five of the six grass beds identified on the site. The Huron-Wendat Nation mentions that the loss of a natural habitat is important to them, regardless of its area.

Finally, the Proponent proposes an acoustic monitoring program for the work in the construction and operation phase to ensure compliance with the underwater noise thresholds so as to protect aquatic fauna from potential harmful or lethal exposures. A follow-up program would also be deployed to allow verification of the achievement of the objectives of the proposed fish habitat compensation project or projects.

5.3.2 Agency Analysis and Conclusions on Residual Effects

In view of the implementation of the key mitigation measures identified below, the Agency is of the opinion that the Project is unlikely to have significant adverse effects on fish and fish habitat, including benthic fauna, species at risk and marine plants. The Project would not cause losses of habitat or habitat functions that would not be offset under the *Fisheries Act*.

Analysis of the Effects

The Agency considers that the Proponent has adequately surveyed and documented the effects of its Project on fish and fish habitat. Fisheries and Oceans Canada estimates that the construction of the terminal would result in the destruction and alteration of approximately 600 square metres of fish habitat due to the encroachment of loading platforms and dolphins, as well as potential effects on surrounding aquatic grass beds. The Project would cause habitat losses or modifications for several fish species, and may therefore require an authorization under paragraphs 34.4(2)b) and 35(2)b) of the *Fisheries Act*.

The Project has been optimized to minimize the effects on fish and fish habitat. The chosen site would allow construction of a wharf on piles limiting encroachment on fish habitat, because the water depth is adequate for ships near the shore. Most of the encroachment would be on habitats that do not have exceptional value, but that are likely to support a variety of biological activities for certain species, primarily fish associated with soft bottoms, particularly Atlantic wolffish. The encroachment would be irreversible, but a compensation plan would help to offset the habitat losses. Such a plan has not yet been presented by the promoter, but would be developed with Fisheries and Oceans Canada in the context of their regulatory enforcement process and in consultation with the First Nations.

The Agency considers that the legislation and regulations governing ballast water management would ensure good management of this water to avoid the introduction of invasive alien species into the Saguenay River. Transport Canada states that the new Ballast Water Regulations, effective June 2021, will, among other things, reduce the risks of introducing and spreading aquatic invasive species. However, Fisheries and Oceans Canada mentions that uncertainty remains due to the salinity conditions in the area, which vary significantly depending on the depth and season. A residual effect of the Project on fish and fish habitat is likely through the introduction of invasive aquatic species (Fisheries and Oceans Canada, 2021). The Agency therefore considers that, despite the management of ballast water through Transport Canada regulations, a follow-up program would be necessary.

Uncertainty also remains regarding the effects on fish and fish habitat caused by the work methods that would be used and whether blasting and pile driving would be used in the construction of the terminal. This uncertainty would be addressed by Fisheries and Oceans Canada as part of the Fisheries Act review process. Additional mitigation measures may be required to avoid mortality or other adverse effects on fish (Fisheries and Oceans Canada, 2021).

With respect to soils, Environment and Climate Change Canada recommends that the principle of non-degradation of the receiving environment be respected at all times, i.e., to take into consideration the local ambient concentrations of the soils of the receiving environment by avoiding increasing the concentrations of contaminants in them, even if they are below the CCME Canadian Soil Quality Guidelines (CSQG). In addition, Environment and Climate Change Canada is of the opinion that soils with concentrations of a substance above background levels should not be brought closer to an aquatic environment.

Furthermore, Environment and Climate Change Canada is of the opinion that there is a lack of information on snow and ice removal operations on marine infrastructure, as well as on the tasks carried out on board floating elevating platforms that could affect the quality of surface water in the marine environment. However, the planned monitoring and follow-up activities will make it possible to remedy these shortcomings.

The Agency relies on the opinion of Fisheries and Oceans Canada and Environment and Climate Change Canada to conclude that the construction of the terminal is not expected to cause any further residual effects on fish and fish habitat, considering the implementation of appropriate measures.

Conclusion

Given the application of the key mitigation measures indicated below, the Agency assesses that the residual effects of the Project on fish and fish habitat, including benthic fauna and species at risk, would be moderate. The Agency's assessment is based on the environmental effects assessment criteria in Appendix A and the following findings:

- The magnitude of the Project's residual effects on fish and fish habitat, including benthic fauna and marine plants, would be low because the effects would create little or no hindrance to the progress of one or more important phases of the fish lifecycle.
- The magnitude of the Project's residual effects on fish species at risk would be low since these effects would not hinder the maintenance or management or recovery of one or more of these species;
- The Project would result in long-term residual effects on fish and fish habitat, including the benthic fauna and the species at risk over a range that is:
  - local for the Project site;
  - regional for the sector along the Saguenay River and the St. Lawrence Estuary.
- The Project's residual effects on fish, including benthic fauna and species at risk, would be continuous and partially reversible over time and would be continuous and irreversible on their habitat.

Determination of Key Mitigation Measures

In addition to the measures mentioned in Section 6.1.2, the Agency determined the key mitigation measures required to ensure that the carrying out of the Project has no significant adverse environmental effects on fish and fish habitat, including benthic fauna, species at risk and marine plants. It took into account the mitigation and compensation measures proposed by the Proponent, the views of government experts, and comments from First Nations consulted and the public. The Agency also ensured that measures compatible with their recovery programs are taken to avoid, mitigate and monitor the deleterious effects on species at risk if the Project goes ahead. The key mitigation measures are as follows:

Fish-Specific Measures

- Carry out the construction work outside the existing restriction periods for fish (unless authorized by Fisheries and Oceans Canada to carry out work outside these periods):
  - Conduct work in fish habitat between October 10 and May 31;
  - Conduct work between sunrise and sunset, between June 1 and October 5, inclusively.
- In the loading platforms sector, do not project any light directly at the water and use a low lighting level in the sector, rapidly falling to less than 0.5 lux at a distance of approximately 150 metres offshore, which should not disturb the aquatic species that frequent the sector, more specifically in migration periods (spring and fall);
- Develop, to the satisfaction of Fisheries and Oceans Canada and in consultation with willing First Nations, and implement a pre-construction compensation plan for fish and fish habitat and loss of aquatic vegetation and intertidal meadows:
  - Submit the compensation plan approved by Fisheries and Oceans Canada to the Agency prior to implementation;
  - Discuss, prior to the implementation of the compensation plan, with willing First Nations the opportunities for their involvement in the implementation of the compensation plan, and allow for their participation in the implementation.
- For any fish habitat compensation measures proposed in any compensation plan that may result in adverse environmental effects that were not considered in the environmental assessment, develop and implement, in consultation with willing First Nations and appropriate authorities, measures to mitigate those effects. Submit these measures to the Agency prior to their implementation;
- Implement measures to mitigate noise disturbance in an aquatic environment attributed to the Project, in addition to those presented in section 5.2:
  - Trigger small scare loads to deter fish prior to the start of work that may cause acoustic disturbance;
  - Start drilling and pile-driving operations in a gradual and continuous manner over a period of 20-30 minutes to allow fish to move away from the work area prior to reaching maximum sound intensity;
  - Provide noise abatement measures in the event of significant and recurring dead or injured fish within the work area (indicative of high underwater noise levels for noise-sensitive aquatic organisms);

- Prohibit the detonation of explosives in or near fish habitat that produce or may produce an instantaneous pressure change greater than 30 kPa in a fish swim bladder.

Specific Measures for Work in the Aquatic environment and for Sediment Management

- Do not dispose of any spoil, waste or debris below the high water mark of high tide, including the installation of containment devices, and immediately remove any spoil, waste or debris deposited in this area. Contain or stabilize unconsolidated excavated material to prevent the release of sediment into the aquatic environment;
- Limit construction activities involving the use of machinery operating from the intertidal zone;
- Perform as much work as possible in the littoral zone from barges equipped with a crane or by means of a barge with anchor piles (jack-up barge), so as to minimize traffic in the intertidal and riparian zone. In the event of the necessity of resorting to machinery circulating in the intertidal zone, convert the equipment to vegetable-based hydraulic oil;
- For equipment on barges during construction of marine infrastructure, install a retention pond to avoid spills in the aquatic environment;
- For work carried out above the high water mark, implement effective measures to limit the input of sediments from the construction site into the aquatic environment and ensure their maintenance (for example, sediment barrier, berms, sediment trap, sedimentation basin, temporary stabilization of embankments, diversion of water to vegetated areas). The measures must remain effective during temporary closure of the site and during periods of flooding or heavy rainfall;
- Perform close monitoring during the excavation and profiling work to detect any possibility of detaching. In case of doubt, deploy corrective measures to avoid any slippage;
- When placing piles, collect and dispose of drilling mud on land;
- Decant the pumped water before returning it to the water body;
- Perform the concreting work according to appropriate work methods allowing circumscription of the work area and avoidance of the flow of concrete residues into the water;
- Do not refuel any ships from the loading platforms;
- Do not discharge any debris into the aquatic environment. All accidentally introduced debris should be removed as soon as possible;

Measures Specific to Surface Water and Groundwater Management

- Visually delineate the work area to minimize the footprint in watercourses;
- Maintain, during operation, a vegetated riparian buffer strip, at least 15 metres wide, along the natural high water mark of water bodies, along any water body, wetland or access road, except for the locations of components required for the Project (including erosion and sedimentation control measures). Conduct work or activities within the vegetated riparian buffer only if necessary for safety reasons or to implement and maintain any component of the Project:

- Ensure that any employee or contractor associated with the Project who is required to remove a tree greater than 150 millimetres in diameter located within the vegetated buffer strip obtains authorization from the site manager prior to removal.

- Divert runoff to a vegetated area at least 30 metres from the watercourse or intercept runoff with sediment barriers or a sedimentation basin;
- Maintain undisturbed vegetation along watercourses, wetlands and access roads. For the removal of a tree larger than 150 millimetres in diameter, obtain authorization from the project manager's environmental officer prior to the work;
- To prevent the release of suspended solids into the environment, apply dust suppressants as required on surfaces where traffic may cause dust to be raised during the work. The dust suppressant used shall comply with NQ 2410-300;
- Prohibit fording crossings. Restrict machinery and truck traffic to the right-of-way of access roads and work areas;
- Restore, progressively, riparian strips disturbed by the construction work by using species indigenous to the Saguenay and to this type of environment to reproduce the natural shoreline of the watercourse or water body. Restoration should be done as the work is completed;
- Avoid work near watercourses during heavy rainfall;
- Implement effective measures to limit the dispersion of suspended sediments in the aquatic environment and ensure their proper functioning. Measures should be put in place to limit fish entrapment;
- During the works, respect the natural drainage of the environment and take all appropriate measures to allow the normal flow of water;
- When preparing the land at the plant site, ensure that the soil is levelled to allow runoff water to reach a temporary sedimentation basin. Implement appropriate treatments to reduce concentrations of suspended solids and hydrocarbons prior to their return to the water environment;
- When constructing ditches or drainage works, reduce the slope of the ditch if necessary by installing obstacles at regular intervals that will prevent erosion by reducing velocity while filtering particles (sandbags, straw bales, etc.). Divert water to a vegetated area outside the right-of-way or capture water within the existing drainage system. If necessary, construct a sedimentation basin outside this strip to capture runoff and transported sediments. This should be sized according to the flow to be received and discharged. Consider periods of high water, heavy rainfall and freezing temperatures when operating these mechanisms and maintain them on a regular basis. The Proponent shall repair any damaged mechanisms as soon as technically feasible;
- Implement a drainage system during construction and operation consisting of temporary and permanent stormwater collection, control, and treatment structures that respects natural watershed boundaries and limits the increase in peak flooding from pre-existing natural conditions to mitigate environmental effects on fish and fish habitat. In doing so:
  - Establishing control points at all locations where water that has been in contact with infrastructure associated with the Project is released to the aquatic environment;
  - Ensuring that runoff from natural slopes does not enter the contact waters;

- Construct the liquefaction plant pad in such a way as to allow for the recovery, independently of the external stormwater system, of suspended solids and any contaminants that have the potential to leak in liquid form to the aquatic receiving environment;
- Submit to the Agency, prior to construction, the location of all temporary and permanent structures associated with the drainage system that takes into account the final engineering of the Project. For works required for construction, indicate the planned works as construction progresses.

- Maintain the hydraulic connection between unnamed lake #2 and the downstream section of stream CE-03;
- When necessary, direct water from the basin used for rinsing concrete mixers, pumps and other concrete tools to the concrete plant located on the Saguenay Port Authority property, where it will be treated by the plant's water treatment system. Carry out the routing of rinsing water under constant supervision;
- Carry out concreting work using work methods that limit the work area and avoid the discharge of concrete residues into the natural environment;
- Prohibit the refuelling of ships with hydrocarbons from loading platforms or other infrastructure on the Project site;
- Discharge water from liquefied natural gas tank leak tests into a retention basin designed to have the capacity to store and adapt the discharge rate to the transit capacity of the natural ditch. Adjust the effluent flow rate using a control device to be installed at the outlet of the retention basin;
- Take measures to ensure that the sampling rate during leakage tests does not affect the environment at the water intake so as not to affect the physicochemical parameters of the water;
- Use abrasives (sand and gravel) instead of de-icing agents in winter, and water as a dust cover. If a dust suppressant is to be used, the product chosen must comply with provincial standard NQ 2410-300 and the product must not be disposed of or rinsed off the equipment in or near a ditch, watercourse or on vegetation;
- Prohibit the discharge of snow into a watercourse and within the 30-metre strip of a watercourse. In the event of the installation of a storage area for cleared snow, it must be located at a minimum distance of 30 metres from any watercourse;
- Store hazardous materials and noxious substances in watertight containers or tanks and in retention basins, bins or berms with a capacity of 110% of the containers stored, at all temporary or permanent storage sites, including on self-elevating platforms ("barges");
- Park and wash machinery and equipment more than 60 metres from any watercourse, including the Saguenay River, or body of water and outside of any wetland;
- Refuel any vehicle or equipment off-site, unless it is not technically or economically feasible. If refuelling must be done inside the site, it must be at least 60 metres from any body of water (including the Saguenay River) by constantly monitoring the refuelling and avoiding any dripping on the ground;
- Maintain any vehicle or equipment off-site and according to the manufacturer's specifications to keep it in good working order. Inspect any vehicle or equipment periodically to prevent petroleum products leakage and document the results of any inspection;

- For shoreline blasting, use a type of explosive designed for use in wet or damp areas. Blasting should be carried out in accordance with good practice to limit fracturing of rock and disruption of the groundwater flow system.

Specific Measures for Soil Management

- Conduct a pre-construction and pre-operational environmental soil quality characterization in any section of the limited study area where the Proponent believes that activities that may have contaminated soils have previously occurred. If the results of the characterization demonstrate that soils have been contaminated in a given area, remediate the soils prior to undertaking any project-related activities in that area.

Need for Follow-up and Follow-up Requirements

Apart from the underwater noise monitoring program proposed in Section 5.2 – Marine mammals, including the St. Lawrence beluga whale, the Agency recommends that the follow-up program includes the following requirements to verify the forecasts of effects on fish and fish habitats, including invertebrates, species at risk and marine plants, as well as the efficacy of the proposed mitigation measures.

- Develop, before construction and in consultation with Fisheries and Oceans Canada, Environment and Climate Change Canada and the First Nations who wish it, a follow-up program to verify the accuracy of the environmental assessment and judge the efficacy of the mitigation measures relating to the environmental effects of the Project on fish and fish habitat. Implement this program during construction and for at least five years after the end of construction. In the context of implementing the follow-up program:
    - Monitor, visually, aquatic work areas during construction on a daily basis for the presence of dead or injured fish;
    - Monitor, during construction and for at least five years following completion of construction, the use of the water bodies and littoral zone of the limited study area by the various fish species;
    - Develop and implement modified or additional mitigation measures if the results of the monitoring show that modified or additional mitigation measures are necessary to mitigate the adverse environmental effects on the fish and fish habitat;
    - Before the end of the fifth year after the end of construction, determine, in consultation with the parties consulted during the development of the follow-up program and according to the results of the monitoring, if additional monitoring is required. If additional monitoring is required, update the follow-up program and implement the additional requirements of the follow-up program.
- Develop, before construction and in consultation with Fisheries and Oceans Canada, Environment and Climate Change Canada and the First Nations who wish it, a follow-up program to determine the effects of the activities and the changes incurred on the grass beds, particularly regarding hydrosedimentary dynamics. Implement the follow-up program at the beginning of the marine terminal operation phase and for at least the next five years. In the context of the implementation of the follow-up program, the Proponent shall:

- Survey, at least annually and during the optimum growth period of the vegetation (generally the month of August), the contour of grass beds H1, H2 and H3, as well as another small grass bed present in the neighbouring zone, with the DGPS[58] to allow a ruling on the changes in the area, density and composition of the grass beds;
- Inventory, within the parcels, the number of stems per surface unit with the goal of determining the density of the stems and the diversity of the species present there. The number of parcels will be defined according to the area of each of the grass beds and their homogeneity;
- Develop and implement modified or additional mitigation measures if the results of the follow-up show that modified or additional mitigation measures are necessary to mitigate the adverse environmental effects on the submerged grass beds;
- Before the end of the fifth year of the program, determine, in consultation with the parties consulted during the development of the follow-up program and according to the results of the monitoring, if additional monitoring is required. If additional monitoring is required, update the follow-up program and implement the additional requirements of the follow-up program.

- Develop, before construction and in consultation with Fisheries and Oceans Canada, Environment and Climate Change Canada and the First Nations who wish it, a follow-up program to assess the recovery and use of the environment by benthic fauna, but also note the changes within the benthic community. Implement the follow-up program at the beginning of the marine terminal operation phase and for at least three follow-ups (in Appendices 1, 3 and 5). In the context of the implementation of the follow-up program:
  - Deploy a follow-up system with the markers implanted in the rock. Thus, from the baseline, georeferenced metal marks can be deployed by drilling. These markers, positioned every five metres of depth (between 25 and 10 metres deep), to identify the inventory stations and transects where monitoring will take place;
  - Produce five transects by diving, composed of four stations each so that the entire zone neighbouring the marine terminal is well covered. They must be filmed;
  - Develop and implement modified or additional mitigation measures if monitoring results demonstrate that modified or additional mitigation measures are needed to mitigate adverse environmental effects on submerged seagrass beds;
  - Prior to the end of the fifth year of the program, determine, in consultation with parties consulted in the development of the follow-up program, and based on the results of the monitoring, whether additional monitoring is required. If additional monitoring is required, update the monitoring program and implement the additional monitoring program requirements.
- Do daily visual monitoring of the work area to detect the presence of dead or injured fish. Develop and implement modified or additional mitigation measures if the results of the monitoring show that modified or additional mitigation measures are necessary to mitigate the adverse environmental effects on fish;

[58] Differential Global Positioning System

- Develop, prior to construction and in consultation with Fisheries and Oceans Canada, a follow-up program to verify the accuracy of the environmental assessment of the potential introduction of aquatic invasive species from ballast water. Implement the follow-up program from the start of the marine terminal operation phase. As part of the implementation of the monitoring program:
  - Develop and implement a system at the terminal structures to detect the arrival of a new species as soon as possible;
  - Develop and implement modified or additional mitigation measures if monitoring results demonstrate that modified or additional mitigation measures are required to mitigate adverse environmental effects where appropriate.
- Develop, prior to construction and in consultation with Fisheries and Oceans Canada, a sound pressure monitoring program to ensure that the work does not result in fish mortality or injury (section 5.2);
- Develop, prior to construction and in consultation with Environment and Climate Change Canada, and implement, upon commencement of construction, a follow-up program to verify the accuracy of the environmental assessment and to assess the effectiveness of mitigation measures with respect to the environmental effects of changes in surface water quality. As part of the development of the follow-up program, identify the quality criteria against which the suspended solids and pH measured in the follow-up program will be compared and which may require the implementation of modified or additional mitigation measures. As part of the implementation of the monitoring program:
  - Monitor water volumes transferred as part of the natural gas tank leak testing;
  - Monitor the quality of stormwater discharged at all outfalls, including the retention pond outfalls for Industrial Plat 2, 3, and 4 shown on Map 2-11 submitted in response to the Second Information Request (WSP, December 2020). Include chlorides, calcium, sodium, iron, lead, cadmium, copper, chromium, and zinc and conduct monitoring for each compound at least monthly, during the product use seasons that contain each of these compounds;
  - Develop and implement modified or additional mitigation measures if monitoring results demonstrate that modified or additional mitigation measures are required to mitigate the environmental effects of changes to surface water quality.
- Develop, prior to construction and in consultation with Environment and Climate Change Canada, a follow-up program to verify the adequacy of the environmental assessment and to assess the effectiveness of mitigation measures with respect to the environmental effects of changes to groundwater quality. Implement the follow-up program no later than one year after the start of construction and continue the implementation of the follow-up program at least annually during operation and closure. As part of the implementation of the follow-up program:
  - Monitor groundwater quality in the restricted study area, including from at least one observation well located between the south of the industrial pad and the southern boundary of the restricted study area and at least one observation well located between the retention pond for industrial pad 3 and the eastern boundary of the restricted study area. Include sodium, calcium, and ammonia nitrogen ions in the compounds it monitors for groundwater quality;

- Develop and implement modified or supplemental mitigation measures if monitoring results demonstrate that modified or supplemental mitigation measures are necessary to mitigate the environmental effects of changes to groundwater quality.

5.4 Vegetation and Wetlands, Including Species at Risk

The Project could have residual adverse environmental effects related to the destruction of a number of hectares of vegetation and wetlands. However, the Agency is of the opinion that these effects are unlikely to be significant with the implementation of mitigation, compensation and follow-up measures recommended in this section. In determining the significance of the effects on vegetation and wetlands, the Agency assessed, in particular, whether the Project is likely to result in a net loss of wetland functions and whether the affected wetlands are located in an area where the wetlands or their functions require special measures under the Federal Policy on Wetland Conservation.

5.4.1 Analysis of Potential Effects and Proposed Mitigation Measures

Description of the Component

The analysis of the effects on this component takes into consideration terrestrial vegetation, forests of phytosociological interest[59] and wetlands. According to the Federal Policy on Wetland Conservation: Implementation Guide for Federal Land Managers (Environment Canada, 1996), a wetland is "land where the water table is at, near, or above the surface or which is saturated for a long enough period to promote such features as wet-altered soils and water tolerant vegetation." The main purpose of the Federal Policy on Wetland Conservation (the Policy; Environment Canada, 1991) is to "promote the conservation of Canada's wetlands to sustain their ecological and socioeconomic functions, now and in the future."

For wetlands that are not on federal lands, Quebec's *Environment Quality Act* applies. This statute prescribes the use of the "avoid-minimize-compensate" sequence. The land where the Project is located is covered by this Act.

As mentioned in the environmental impact statement, coniferous communities account for nearly 70% (417 hectares) of the total productive forest area in the study area, and mixed communities account for about 30% (181 hectares). The inventory carried out by the Proponent does not show the presence of any forest communities of phytosociological interest or any invasive alien plant species. The presence of reed canary

[59] Phytosociological: Phytosociology is the science of studying the relationships between the vegetation communities and their ecosystem, including human societies. In the Proponent's impact statement (WSP, January 2019), forest communities of phytosociological interest are defined as stable, evolved communities, communities resulting from particular physiographic conditions or communities made up of transgressive species. The Proponent considered old-growth yellow birch, black ash, white pine, red pine and cedar stands as well as yellow birch and tolerant hardwood maple stands, regardless of age.

grass (*Phalaris arundinaceae*), an invasive plant species, was confirmed along a roadside and on fallow land located less than 500 metres east of the study area.

In 631.94 hectares in the study area (Figure 8), a total of 40 wetlands covering an area of approximately 47 hectares, consisting primarily of shallow water, open peatland and wooded peatland, were identified (WSP, January 2019). These wetlands are mainly located in the southern and western portions of the study area. The riparian wetlands of greatest ecological interest along the navigation corridor (Figure 9) are those of Saint-Fulgence, Anse Saint-Jean, Baie Sainte-Marguerite, Baie des Petites-Bergeronnes and Baie des Grandes-Bergeronnes (WSP, June 2020).

Potential Effects

Project's activities that could affect vegetation and wetlands include site preparation (clearing, stripping, excavation, backfilling, culvert construction); transportation of materials; the use, movement, refuelling and maintenance of machinery; and the use, storage and handling of hazardous materials.

The development of the various work areas would result in a total encroachment of 101.6 hectares (15.1 hectares of temporary encroachment and 86.5 hectares of permanent encroachment) of terrestrial vegetation. The young coniferous forest would be the most affected by the development of the Project's various facilities (21% of the area of this type of vegetation would be encroached upon). The Pekuakamiulnatsh First Nation stated that it is concerned about habitat fragmentation. It also indicated that maintaining the ecological integrity of the ecosystems is a major issue for members, since maintenance of their distinctive culture depends on it.

The Proponent is also planning a permanent encroachment of 1.36 hectares on the shoreline of the outlet of unnamed lake no. 2 (CE-03) and a permanent encroachment of 11.1 hectares[60] on wetlands (WSP, January 2019 and January 2020). The ecological value of the encroached wetlands is considered moderate. The ecological functions most affected are carbon sequestration, nutrient and organic matter export, and water quality improvement (WSP, January 2020). The public, including the Organisme de bassin versant du Saguenay and Nature Québec (OBV Saguenay, June 2019 and Nature Québec, June 2019), expressed concern about these potential losses. In its report, the Bureau d'audiences publiques sur l'environnement mentions that: "The anticipated loss of wetlands due to the implementation of the Project was also addressed by several participants. In support of their conservation, they put forward the ecological functions and services provided by wetlands, for example for the maintenance of biodiversity, for water filtration and flow regulation, and as carbon sinks favourable to the fight against climate change (Ruba Ghazal, DM9, p. 2; Organisme de bassin versant du Saguenay, DM1125, p. 13; La Planète s'invite à l'Université Laval, DM2353, p. 4 PDF; Eau Secours, DM1272, p. 14 and 15)." The Bureau d'audiences publiques sur l'environnement report also mentions that, "Although the initiator provides for the development of a compensation plan for wetland losses, the Organisme de bassin versant du Saguenay believes that it would not remedy the deterioration of the ecosystem functions that the lost wetlands fulfilled locally" (DM1125, p. 12).

[60] Of this area, 1.6 hectares of wetlands will be disturbed during construction but will be revegetated at the end of the work.

Construction activities could also generate dust and affect vegetation and wetlands in the vicinity of the work (WSP, January 2019). In addition, the transportation of materials and machinery could contribute to the introduction and spread of invasive alien plant species. The Huron-Wendat Nation expressed concern about the likely introduction and spread of invasive alien plant species during construction due to the presence of reed canary grass near the Project site.

During the operation phase, vegetation control would be carried out at the Project site, but no additional deforestation or wetland encroachment is planned. With respect to navigation, the main effect would be the erosion of riparian environments and the degradation of shoreline vegetation resulting from waves generated by passing ships. However, the Proponent stated that commercial navigation is not considered to be a major factor contributing to the erosion of the Saguenay River's shoreline because the predominant rocky banks along the river are less vulnerable and because the river is generally more than 1.5 kilometres wide, which allows ships to pass comfortably more than 600 metres from the banks.

The risks of contamination of terrestrial vegetation and wetlands due to accidents or malfunctions during the construction and operation phases are discussed in section 6.1.

Environment and Climate Change Canada is of the opinion that the Proponent has identified the main sources of impacts and the main potential direct and indirect environmental effects of the Project on wetlands and their functions.

Mitigation and Follow-up Measures Planned by the Proponent

The Proponent optimized the configuration and placement of the proposed terrestrial facilities to minimize vegetation loss and encroachment on existing wetlands (WSP, January 2019). In particular, it applied the "avoid-minimize-compensate" sequence with regard to wetlands in the choice of location of the various components of the Project and would continue to do so in future engineering stages (WSP, January 2020). In addition, the Proponent made a commitment to redo an infrastructure placement optimization exercise during the detailed engineering stages in order to limit the effects on wetlands.

The Proponent plans a number of measures to mitigate the effects on vegetation and wetlands by avoiding additional encroachment, environmental contamination and the introduction of invasive alien species (WSP, January 2019; pp. 418-423).

Measures to address accidents and malfunctions are discussed in section 6.1.

To verify the predicted effects on wetlands and the effectiveness of the proposed mitigation measures, the Proponent proposes an environmental monitoring program.

The Proponent made a commitment to submit a wetland compensation plan that meets the requirements of the Regulation respecting compensation for adverse effects on wetlands and bodies of water (WSP, January 2020). The "no net loss" objective is central to the legal and regulatory provisions concerning wetlands and waterways of the Government of Quebec. The Huron-Wendat Nation stated that it had questions about the wetland and water body compensation program and would like to see compensation measures whose success is quantifiable. The Proponent has committed to consulting the First Nations to ensure that their concerns are taken into account in the development of the compensation plan.

The Proponent also stated that it plans to set up a monitoring program for terrestrial and riparian vegetation. According to the Proponent, the program could include follow-up on plant growth in the areas revegetated following construction work and closure.

5.4.2 Agency Analysis and Conclusions on Residual Effects

In view of the implementation of the key mitigation measures identified below, the Agency is of the opinion that the Project is unlikely to cause significant adverse environmental effects on vegetation and wetlands.

Analysis of the Effects

The Agency notes that the Project would be located in the area of the Lac-Saint-Jean plain, which is subject to high drainage pressure (Joly et al., 2008). However, according to Environment and Climate Change Canada, specifically Appendix 2 of the Implementation Guide for Federal Land Managers (Environment Canada, 1996), the Project would be located in area where wetland loss or degradation was already considered moderate in the early 1990s. The Project would be located in an area where "current or potential development for hydroelectric, forestry and agriculture may significantly impact wetlands." In addition to the mitigation measures discussed above, the Proponent proposes a wetland and water body compensation that reflects the requirements of Government of Quebec's Regulation Respecting compensation for adverse effects on wetlands and bodies of water. In this regard, it should be noted that one of the strategies of the Federal Policy on Wetland Conservation is to "encourage and support provincial and territorial policies that promote wetland conservation." In this context, Environment and Climate Change Canada is satisfied with the Proponent's commitment to compensate for the loss of wetlands in accordance with Quebec government laws and regulations. This commitment also addresses concerns raised by the public and First Nations about the Project's effects on wetlands. Environment and Climate Change Canada notes that the implementation of compensation measures could meet the objectives of the Federal Policy on Wetland Conservation and compensate for loss of function, including loss of habitat for migratory birds and species at risk. However, Environment and Climate Change Canada notes the uncertainties inherent in any wetland compensation project.

Environment and Climate Change Canada is of the opinion that the mitigation measures planned by the Proponent, including the implementation of a compensation, will make it possible to minimize the residual environmental effects of the Project on wetlands.

Lastly, the Agency notes the absence of forest communities of phytosociological interest on the Project site.

Conclusion

With the implementation of the key mitigation measures identified below and the Proponent's commitments under the laws and regulations of the Government of Quebec concerning wetlands and water bodies, the Agency concludes that the Project's residual effects on vegetation and wetlands would be moderate. The Agency's assessment is based on the environmental effects assessment criteria in Appendix A and the following findings:

- The magnitude of the Project's residual effects on vegetation and wetlands would be medium. The wetlands in the study area are of moderate ecological value. The Project would result in the destruction of wetlands that perform various ecological functions, but a compensation would be implemented so as not to adversely affect the maintenance or management of the wetlands.
- The residual effects would be limited to the Project site (site-specific) and would act over the long term on vegetation and wetlands of moderate ecological value.
- The Project's residual effects on vegetation and wetlands would be continuous and irreversible over time.

Determination of Key Mitigation Measures

The Agency identified the key measures necessary to ensure that the proposed Project does not cause significant adverse environmental effects on vegetation and wetlands. It took into account the mitigation and compensation measures proposed by the Proponent, the opinions of government experts, and the comments received from the First Nations consulted and the public. The key mitigation measures are as follows:

- Optimize the Project to minimize the footprint of the infrastructure (access roads) and the plant (plant, miscellaneous buildings), avoid important habitats (wetlands), reduce encroachment on wetlands and terrestrial and riparian vegetation, and avoid fragmenting these habitats wherever possible;
- Before construction begins, mark off the proposed earthworks and accesses, and identify the deforestation and soil stripping areas and the clearcutting areas so as to minimize the areas to be cleared. Prohibit machinery and vehicles outside those areas;
- Restore, progressively, disturbed vegetated areas by uniformly revegetating work areas, disused access roads, constructed embankments, bare surfaces, and riparian buffers as construction is completed in these areas with deciduous and coniferous species that are native to the area and adapted to the surrounding environment to achieve a vegetation composition and abundance comparable to that of adjacent areas;
- Carry out work in wetlands on frozen ground or during periods of low water levels;
- Maintain drainage conditions in wetlands adjacent to the work areas;
- Require contractors to clean all construction machinery prior to arrival at the work site. The purpose of this cleanup is to completely remove soil, organic matters, plant fragments and visible debris and to prevent the spread of invasive alien species;
- Clean excavating machinery if it is used in areas affected by invasive alien plant species, before it is used again in unaffected areas. Perform the cleaning in areas unsuitable for seed germination, i.e., at least 50 metres from watercourses, water bodies, wetlands and threatened or vulnerable species. Dispose of the waste resulting from the cleaning;
- In the event that compensation under the Government of Quebec's *Environment Quality Act* is developed through a compensation plan developed by the Proponent, consult with the Agency, Environment and Climate Change Canada and First Nations to ensure that their concerns are addressed in the plan. Discuss with each First Nation the opportunities for their participation in the implementation of the plan. Prior to the submission of the final compensation plan to MELCC, inform Environment and Climate

Change Canada and First Nations about how their views and information were considered in the development of the plan, including the rationale for why the views and information were, or were not, incorporated into the compensation plan.

Need for Follow-up and Follow-up Requirements

The Agency considers that a follow-up program is required to verify the accuracy of the environmental assessment and to assess the effectiveness of mitigation measures with respect to vegetation and wetlands:

- Develop, prior to construction and in consultation with Environment and Climate Change Canada and willing First Nations, a follow-up program to verify the accuracy of the wetland environmental assessment. Implement the follow-up program from the beginning of the construction phase of the marine terminal and for at least the first five years of the phase. As part of the implementation of the follow-up program, include wetlands adjacent to those that would be temporarily or permanently encroached upon, to ensure that the planned protection measures are effective, and to verify the presence of indirect effects on wetlands related to interconnections between them;
- Develop, prior to construction and in consultation with Environment and Climate Change Canada and willing First Nations, a revegetation monitoring program for all revegetation and planting work performed. Implement the follow-up program two years following construction according to pre-established measures to verify the success of the vegetation establishment and the absence of invasive alien species in the newly vegetated areas.

5.5 Birds, Including Species at Risk, and Their Habitats

The Project could have residual effects on birds and their habitat, including species at risk, resulting from loss of habitat, unintentional mortality from traffic or collisions with structures, as well as incidental take and disturbance of birds, their nests, or their eggs due to noise and light levels. However, the Agency is of the opinion that these effects are unlikely to be significant by implementing the mitigation and follow-up measures recommended in section 5.5.2. In determining the significance of effects on birds and their habitat, the Agency assesses whether the effects would interfere with one or more critical phases of their lifecycle, the maintenance of their populations, or the maintenance, management, or recovery of species at risk.

5.5.1 Analysis of Potential Effects and Proposed Mitigation Measures

Description of the Component

The analysis of effects on this component takes into consideration migratory[61] and non-migratory birds[62], and their habitats. The Agency considered birds listed in Schedule 1 of the *Species at Risk Act* as well as those for which the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) recommends a status[63].

On the Project site and in its immediate vicinity, 132 species are potentially present on an annual basis (WSP, January 2019). In field inventories of the study area, a total of 77 species were observed in the nesting period, 44 species in the spring migration period, and 24 species in the fall migration period.

Habitats of interest in the vicinity of the Project site include five aquatic bird concentration areas (ABCAs), located at distances ranging from 4.08 kilometres to 15.40 kilometres from the Project site, and one Important Bird Area (IBA), located approximately seven kilometres away. For wetlands, a detailed description is provided in Section 5.4 – Vegetation and Wetlands. These environments are important habitats for birds.

Several ABCAs and IBAs are also present in the area around the mouth of the Saguenay River and adjacent to the estuary. These sites are sought after by waterbirds, seabirds, and shorebirds, and have high ecological value (WSP, April 2019). The intertidal marshes are particularly frequented by many migratory birds in spring and fall. Among the species that frequent the Lower Estuary in winter, the presence of Barrow's Goldeneye, a species of special concern, is noteworthy (WSP, April 2019).

The steep banks of the Saguenay River are less suitable for waterfowl nesting and feeding compared to the mouth of the Saguenay River (WSP, January 2020). It should be noted, however, that several thousand Snow Geese and hundreds of Canada Geese pass over the Saguenay River.

Species at Risk

A total of 16 species of birds at risk[64] may be using the Project site (Table 15). Of these, Peregrine Falcon, Canada Warbler, and Evening Grosbeak were observed in field inventories during the nesting period. In addition, potential habitats are present on the Project site for the Rusty Blackbird, Barn Swallow, Common Nighthawk, Eastern Whip-poor-will, and Eastern Wood-pewee, although these species were not observed during the Proponent's inventories (Figure 10). Environment and Climate Change Canada confirms that no critical habitat for avian wildlife at risk is present in the limited and local study area. A unit of critical habitat

[61] Migratory birds: birds identified and protected by the *Migratory Birds Convention Act* and listed in the schedule to that act.
[62] Non-migratory birds: birds that are not protected under the *Migratory Birds Convention Act*.
[63] Species designated or likely to be designated under the Quebec *Act respecting threatened or vulnerable species* are not considered as they has been assessed with under the Quebec government's environmental assessment process.
[64] Only species at risk under SARA are discussed in this report. According to the Proponent's information, two additional species of special status (provincial only) may also frequent the Project site: the Golden Eagle and the Bald Eagle. These species has been assessed with under the Quebec government's environmental assessment process.

for the Eastern Whip-poor-will is present in the larger study area at the mouth of the Saguenay and St. Lawrence Rivers, but the Saguenay and St. Lawrence Rivers do not provide suitable feeding and nesting habitat for the species (Environment and Climate Change Canada, 2021).

Table 15: List of Species at Risk Likely to Use the Study Area or Whose Presence Is Confirmed

Species		Species Status[65]	
Common Name	Scientific Name	*SARA*[66] (Appendix 1)	COSEWIC[67]
Bank Swallow	*Riparia riparia*	Threatened	Threatened
Barn Swallow	*Hirundo rustica*	Threatened	Threatened
Barrow's Goldeneye	*Bucephala islandica*	Special concern	Special concern
Bobolink	*Dolichonyx oryzivorus*	Threatened	Threatened
Canada Warbler*	*Cardellina canadensis*	Threatened	Special concern
Chimney Swift	*Chaetura pelagica*	Threatened	Threatened
Common Nighthawk	*Chordeiles minor*	Threatened[68]	Special concern
Eastern Meadowlark	*Sturnella magna*	Threatened	Threatened
Eastern Wood-pewee	*Contopus virens*	Special concern	Special concern
Evening Grosbeak*	*Coccothraustes vespertinus*	Special concern	Special concern
Least Bittern	*Ixobrychus exilis*	Threatened	Threatened
Olive-sided Flycatcher	*Contopus cooperi*	Threatened[67]	Special concern
Peregrine Falcon*anatum**	*Falco peregrinus anatum*	Special concern[67]	Not at risk
Rusty Blackbird	*Euphagus carolinus*	Special concern	Special concern
Short-eared Owl	*Asio flammeus*	Special concern	Special concern
Eastern Whip-poor-will	*Antrostomus vociferus*	Threatened	Threatened

*Confirmed presence (species in blue) through inventories conducted by the Proponent during the nesting period

[65] The statuses listed in the Impact Statement have been revised as of February 17, 2021, to reflect changes since the study was submitted to the Species at Risk Public Registry.
[66] Species at Risk Act
[67] Committee on the Status of Endangered Wildlife in Canada
[68] Under review for change of status

Potential Effects

Habitat Loss – Migratory and Non-migratory Birds

Permanent habitat loss due to the Project, including deforestation for the construction of the plant and associated buildings, would be in the order of 70.02 hectares (230 nesting pairs) in softwood (or softwood-dominated) forests and 16.45 hectares (51 nesting pairs) in mixed hardwood-dominated stands. Temporary habitat loss related to the deforestation of the storage area, which would be revegetated, is estimated at 9.27 hectares (30 nesting pairs) for softwood forests and 5.83 hectares (18 nesting pairs) for mixed wood stands. No habitat loss is anticipated outside of the Project infrastructure site (WSP, June 2020).

The main species that are likely to be affected by wetland loss are those that are typical of forested areas and with a preference for wetland habitats, which includes migratory forest birds (WSP, January 2020). The species likely to be most affected by the Project are Alder Flycatcher, Swamp Sparrow, White-throated Sparrow, and Wilson's warbler. The general habitat loss associated with this type of environment was discussed in Section 5.4. This results in an estimated 14 affected nesting pairs in open bogs and one affected nesting pair in shallow water habitats (including beaver ponds), respectively (WSP, January 2019).

At the Project site, raptors and waterbirds, most of which are migratory species, would not be affected by the planned wetland encroachments, except in the shallow water area that may be used (0.51 hectares) (WSP, January 2020).

Environment and Climate Change Canada believes that losses of nesting and foraging habitat have potential effects on birds, particularly on breeding pairs that will need to relocate to similar habitats nearby, when available. When similar habitats become scarce, this can lead to increased bird density in the same habitat, resulting in resource scarcity and increased predation. Habitat destruction and degradation thus contribute directly or indirectly to the decline of some of the more vulnerable species. Some pairs of birds will be able to successfully establish themselves elsewhere, while others will not, given their greater vulnerability to disturbance of breeding habitat, intra- and interspecific competition, or predation (Environment and Climate Change Canada, 2021).

In addition to habitat loss, changes in habitat fragmentation and structure are expected and could affect the distribution of bird species.

The Huron-Wendat Nation believes that the permanent or temporary destruction of habitats sheltering approximately 300 nesting pairs of various species is a large-scale disturbance and that the Proponent's proposed mitigation measures for the Project are insufficient to reduce the extent of permanent habitat loss. Furthermore, the Nation regrets that the Proponent is underestimating the Project's residual effects by failing to consider indirect effects on the food chain of bird populations with a risk status. This is exemplified by the Peregrine Falcon, whose feeding behaviour could be affected by habitat loss of the insectivorous birds on which it feeds. The Innu First Nations share these concerns regarding the Project's potential effects on the entire food chain.

Habitat Loss – Bird Species at Risk

Habitat loss caused by the presence of infrastructure could affect approximately three nesting pairs of Canada Warblers (special concern), on an area of approximately 30.21 hectares in all habitats of the study area. The Proponent has indicated that there are replacement habitats within the local study area. The Proponent has not inventoried any Canada Warblers in the wetlands or in their periphery that would be affected by the Project.

Although there were no identified habitats for this species at the Project site, the Proponent did indicate that a pair of Evening Grosbeaks could be affected since they were observed during the inventory.

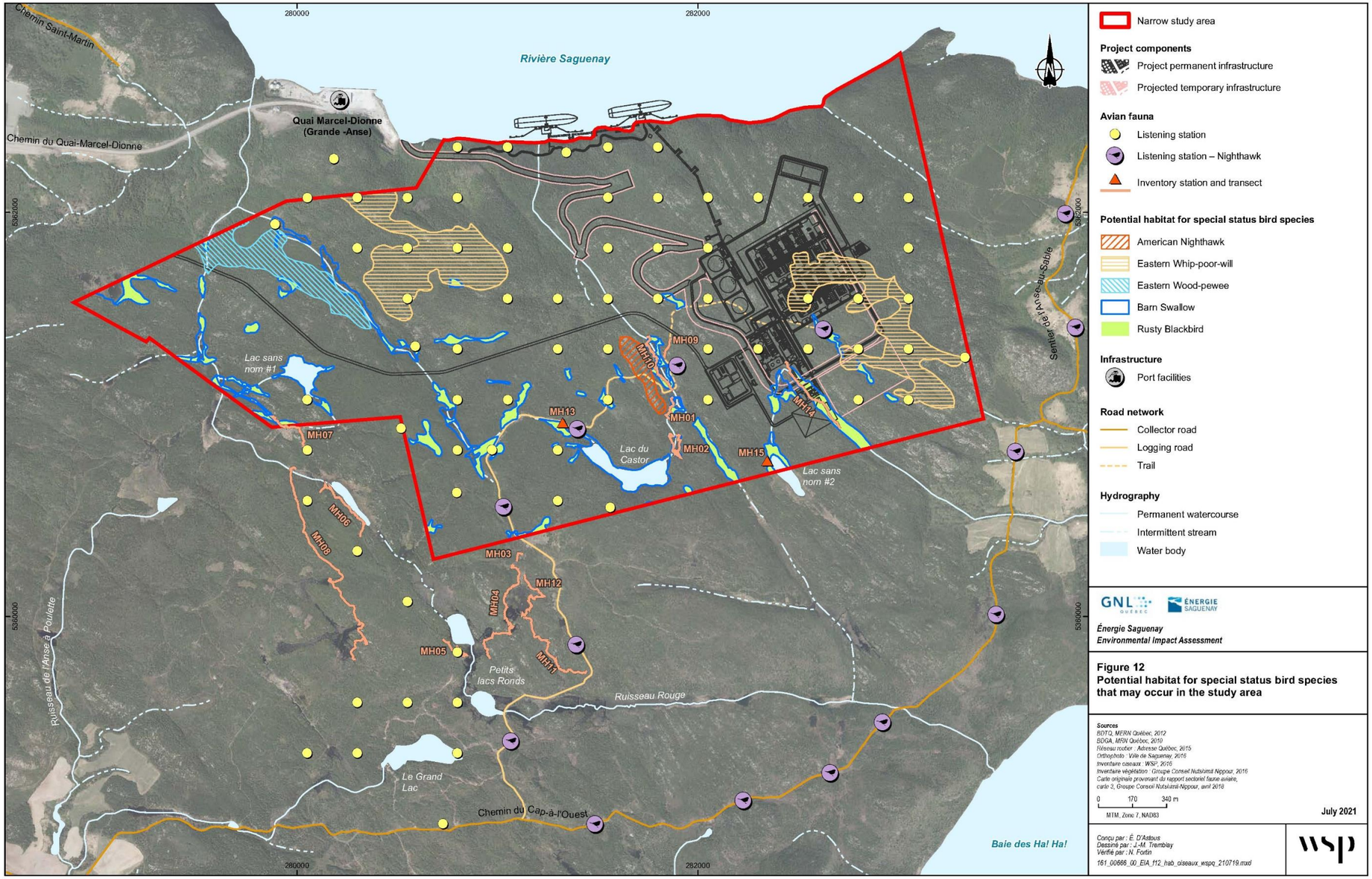
Peregrine Falcons, however, should not be affected by habitat loss since they build their nests on steep cliffs, which are not found on the plant site.

There could be a potential loss of nesting and feeding habitat for Eastern Whip-poor-will (10.07 hectares), Eastern Wood-pewee (0.05 hectares), Barn Swallow (3.87 hectares), and Rusty Blackbird (3.36 hectares). The Project would not cause any habitat loss for the Common Nighthawk (WSP, January 2020).

The Pekuakamiulnuatsh First Nation is concerned about the quality of the residual habitat for species at risk affected by habitat loss, particularly the Canada Warbler. Nature Québec, in its contribution to the Bureau d'audiences publiques en environnement process, specifies that the Project would be detrimental to the Canada warbler, an endangered species, as well as to several species of bats, which are already experiencing significant population declines. Other animal species could be adversely affected by the liquefaction plant and marine terminal, primarily because the facilities would result in significant habitat loss and permanent lighting that would be detrimental to many animals. Even if the impacts of the Project [were] primarily felt at the local level, it is important to note that the loss of a population at the local level can still have a major impact on the species as a whole.

It should be noted that Environment and Climate Change Canada is satisfied with the information provided by the Proponent to document the potential effects of the Project on avian species at risk. However, Environment and Climate Change Canada points out that the recovery documents for the Eastern Whip-poor-will, Evening Grosbeak, Olive-sided Flycatcher, Rusty Blackbird and Canada Warbler identify the loss or degradation of habitat in breeding areas as a potential threat to the recovery or survival of these species.

Figure 10: Potential Habitat for Species at Risk at the Project Site and Anticipated Habitat Loss



Source: WSP, July 2021

Effects of Noise, Vibration, and Light

Noise and vibration from infrastructure construction and on-site traffic, refuelling and maintenance of machinery, and human presence could result in avoidance of some noisy areas by some bird species (WSP, January 2019). Furthermore, noise and vibration could lead to changes in the reproductive success of some species, as well as changes in interspecific communication.

During the operational phase, the presence of the facilities, human activity, and vehicle traffic would have the same effect as during the construction phase, but to a lesser extent. Nighttime lighting from the plant and marine infrastructure can affect birds, including migrating birds, by attracting them and diverting them from their migratory route. The light could also disorient them and cause them to fly over the infrastructure for prolonged periods. In poor weather conditions, for example in the presence of fog, collisions with the various lighted structures could result in bird mortality.

Activities at the loading docks (tanker berthing, loading, and departure manoeuvres) could disturb the waterbird species using this area.

In the closure phase, the same effects as in the construction phase are expected.

Effects of Flares

The Proponent has opted to use ground-level process flares surrounded by a thermal wall approximately 20 metres high to reduce the negative effects on birds (collisions and mortality). The height of the flares, the lack of an open flame, and the blocking of heat by thermal walls are features that the Proponent believes would eliminate potential effects on birds passing over the flares while in operation (WSP, January 2020).

The 30-metre-high marine flare would not emit any light or thermal radiation. There is a collision risk, but this type of flare is not expected to attract birds. A follow-up is planned to validate this (see Section 5.5.2).

Effects of Shipping on Birds

Sources of the potential effects of shipping are mainly related to the risks of accidents and malfunctions, wave action, disturbance, and collisions. These risks are already present in the shipping corridor but could grow with increased vessel traffic. The birds most vulnerable to increased shipping on the Saguenay River are seabirds, waterfowl, and shorebirds, including species that nest along the river or spend a significant proportion of their lifecycle there (WSP, January 2019).

In the event of accidents and malfunctions (see Section 6.1 of this report), birds may ingest contaminants, either directly or through accumulation in the food chain (WSP, January 2019). Any spill would primarily have an impact at the mouth section of the Saguenay River, particularly because many habitats of interest to birds are located near the shipping channel and the shallower depth of the area permits longer-term contamination of the sediments (WSP, January 2019).

Wave action, i.e., waves generated in the wake of vessels, can lead to shoreline erosion over time and thus alter sensitive shoreline habitats used by birds. Wave action is believed to be the primary cause of shoreline erosion when the shoreline is within 300 metres of a shipping channel. All coves and bays along the

Saguenay River are located more than 600 metres from the shipping corridor, which reduces the risks associated with wave action.

Innu First Nations have expressed concerns about the effects of shipping on migratory birds, particularly in the event of an accident or spill, and in turn, on their traditional hunting activities.

Cumulative Effects

The Pekuakamiulnuatsh are concerned about the forest ecosystem, particularly the cumulative aspects of deforestation caused by three projects underway in the area: the North Shore Terminal, the Énergie Saguenay Project, and the expansion of the Grande-Anse port. They are particularly concerned about the effects of these projects on the health of waterfowl species and Canada Warblers whose habitats are continually being impacted and who must move to other habitats. In general, noise can lead to habitat disturbance, forced relocation, and reduced nesting success. Environment and Climate Change Canada considers the analysis of the Proponent's cumulative effects on migratory birds and species at risk to be brief. Given the uncertainties about the reasons for the decline of avian species at risk, any additional losses or changes to their habitats are likely to have an effect on them. Habitat losses associated with the Project could combine with those caused by other reasonably foreseeable activities to result in cumulative effects on the nesting habitat of avian species at risk (habitat alteration and loss). Although habitat appears to be abundant in the vicinity of the Project, the accumulation of residual effects over time may reduce the availability of quality habitat for species, thereby increasing intra- and interspecific competition. However, Environment and Climate Change Canada is of the opinion that the contribution of the Project to cumulative effects would be low and that sufficient forest and wetland habitat suitable for the avian species that use it should remain available at the regional scale to support local populations.

Mitigation and Follow-up Measures Planned by the Proponent

The Proponent generally agrees to respect the restriction periods related to avian fauna and to carry out deforestation work outside the period from May 1 to August 15 (WSP, January 2020). However, some deforestation work may be carried out during the nesting season. The Proponent would then implement avoidance, mitigation, and monitoring measures during periods of potential incidental take. If a nest is discovered, a five-step procedure would be followed (discovering the nest, establishing a protection zone, marking the protection zone, monitoring nests and nearby work, and reporting on monitoring) (WSP, January 2020). Environment and Climate Change Canada is of the opinion that the measure to conduct inventories, if clearing is to be carried out during the nesting period of migratory birds, raises uncertainties about its effectiveness. It should be an exception and a last resort. If clearing does occur during this period, Environment and Climate Change Canada recommends that active nest searching not be conducted, as proposed by the Proponent in response to AEIC-2-47 (WSP, December 2020), unless nests are easily located.

As for lighting, the Proponent has planned to reduce excessive brightness, while maintaining a safe level of lighting, and to use amber-coloured lighting to reduce blue light sources in the environment. Environment and Climate Change Canada is satisfied with the proposed mitigation measures to manage light.

Finally, a bird awareness program, which includes migratory birds and species at risk that may be present in the study area, would be implemented for new employees and contractors (WSP, January 2020). Environment and Climate Change Canada is satisfied with the Proponent's proposed action to implement an employee training and awareness program, as this is an important aspect of monitoring during the construction and operation phases.

5.5.2 Agency Analysis and Findings on Residual Effects

In view of the application of the key mitigation and follow-up measures identified below, the Agency is of the opinion that the Project is unlikely to have significant adverse environmental effects on birds and their habitat, including species at risk.

Analysis of the Effects

The Agency believes that the Proponent has adequately identified and documented its Project's effects on birds, including species at risk, and their habitat.

By carrying out deforestation activities outside of the bird nesting period, the Proponent would significantly reduce the negative effects on birds, their nests, and their eggs. Environment and Climate Change Canada believes that it is essential to carry out any activity potentially harmful to migratory birds outside the nesting season in order to avoid injuring, killing or disturbing individuals or destroying and disturbing their nests and eggs.

The Proponent has also proposed several measures that the Agency has deemed key to minimize noise and vibration disturbance, as well as mortality from collisions with infrastructure or vehicles. The proposed follow-up measures, including follow-up on the effect of ground flares on avian fauna, will be essential to validate the anticipated effects of the Project on birds and their habitat, to assess the effectiveness of the proposed mitigation measures, and to address any remaining uncertainties regarding the flares.

The Agency believes that the noise and light generated by the Project could drive birds away from the area or alter their behaviour. It believes that these sensory effects would be localized and would be felt throughout the Project's lifecycle. However, the mitigation measures proposed by the Proponent would reduce these negative environmental effects.

According to the recovery strategy for the Canada Warbler (Environment Canada, 2016), major threats to this species include conversion of breeding habitat land, shrub removal, and collisions with human-made structures and vehicles. The risk of collision is 17.9 times higher than the average for other bird species for all building types. Given that the Project would affect at least a few pairs of this threatened species and about 30 hectares of potential habitat, the Agency believes that adverse effects are possible. The Agency has also noted that similar habitats for this species are available in the vicinity of the Project site and would be disturbed by the Project work or activities during the operational phase.

For the Evening Grosbeak, variations in spruce budworm populations would be one of the primary factors affecting its populations (COSEWIC, 2016). This is in addition to mortality associated with collisions with human-made structures and the reduction in the area of mature and old-growth mixed forests.

The Agency is of the opinion that the Project is unlikely to have any adverse effects on the Peregrine Falcon and the Common Nighthawk since their potential habitats would not be affected. Eastern Whip-poor-will, Eastern Wood-pewee, Barn Swallow, and Rusty Blackbird were not observed during field inventories in 2016. However, some areas may attract these species during nesting.

Environment and Climate Change Canada recommends taking into account the nesting periods of these species in order to target activities that could affect them. It is also of the opinion that the mitigation measures planned by the Proponent would minimize the residual environmental effects of the Project on avian species at risk or their habitat, within the restricted and extended study area, taking into account the mitigation measures that would be applied.

Finally, the Agency believes that the Project is unlikely to cause significant adverse effects on migratory birds, including those that serve subsistence and traditional hunting purposes (Snow Geese, Canada Geese, ducks). Environment and Climate Change Canada does not have any specific concerns regarding the impacts of the Project on migratory bird species of hunting interest. The mitigation measures that would be implemented by the Proponent would make it possible to limit the negative effects of the Project on migratory bird populations, including species of interest for hunting. Furthermore, for land and waterbird species with healthy and resilient populations, Environment and Climate Change Canada is of the opinion that the mitigation measures planned by the Proponent, if implemented in a timely manner, would minimize the residual environmental effects of the Project on migratory birds.

Conclusion

With the implementation of the key mitigation measures identified below, the Agency considers that the Project's residual effects on birds, including species at risk, and their habitats would be moderate. The Agency's assessment is based on the environmental effects assessment criteria in Appendix A and the following findings:

- The magnitude of the Project's residual effects on birds, including species at risk, and their habitats would be low since:
  - Effects would have little or no effect on one or more important phases of the birds' lifecycle;
  - For bird species at risk, such as the Canada Warbler and Evening Grosbeak, effects would not adversely affect the maintenance or management or recovery of one or more of these species.
- The Project would result in long-term residual effects on birds, including special-status species, on a local scale, i.e., located to the Project site;
- The Project's residual effects on birds, including species at risk, and their habitats would be continuous and partially reversible over time, and would be continuous and irreversible on their habitat.

Determination of Key Mitigation Measures

In addition to the measures proposed in Sections 5.4.2 (Deforestation) and 6.1.2 (Accidents and Malfunctions), the Agency has identified the key mitigation measures required to ensure that the Project does not have significant adverse environmental effects on birds, including species at risk, and their habitat. It took into account the mitigation measures proposed by the Proponent, the opinion of government experts, and comments from the First Nations and the public that it consulted. The Agency has also ensured that

measures consistent with any recovery strategy would be taken to avoid, mitigate, or monitor adverse effects on species at risk if the Project does proceed. The key mitigation measures are as follows:

- Carry out for each phase of the Project in a manner that protects migratory birds and avoids injuring, killing, or disturbing them, or destroying, disturbing, or taking their nests or eggs, in particular, from mid-April to early September. For this purpose, the Proponent shall respect Environment and Climate Change Canada's Avoidance Guidelines to reduce the risk to migratory birds. In carrying out the Project, implement measures that comply with the *Migratory Birds Convention Act, 1994*, the *Migratory Birds Regulations*, and the *Species at Risk Act*;
- Not to undertake any activities associated with the construction or operational phases of the Project that would interfere with the nesting of birds (including migratory birds and birds that are listed species at risk) so as to prevent the destruction of nests, eggs, or chicks. In doing so:
  - Determine nesting season periods, in consultation with Environment and Climate Change Canada, for any year in which project-related activities that may affect nesting birds;
  - If it is not technically or economically feasible to carry out an activity that may disturb nesting outside of the nesting season in a given year, submit a justification to the Agency and develop and implement, in consultation with Environment and Climate Change Canada, additional mitigation measures to prevent adverse effects on birds during nesting, which includes their nests, eggs, and chicks. Submit these measures to the Agency prior to implementation.
- Implement measures in all phases of the Project to mitigate noise and vibration attributed to it (these measures are also included in other sections of the report, including sections 5.1, 5.9 and 5.10):
  - Promote the use of white noise back-up alarms;
  - Carry out any major construction activity that may generate noise (including blasting activities and activities requiring the use of heavy equipment, off-road trucks, drills, crushing equipment, generators, compressors and activities that generate impulsive noise) during the day (7:00 a.m. to 7:00 p.m.) Monday to Friday;
  - Reduce and maintain the speed limit to no more than 24 kilometres per hour. Provide signs to indicate speed limits;
  - Use material unloading techniques that minimize truck rear panel slamming during unloading.
- Implement mitigation measures during construction and operation that comply with the Bureau de Normalisation du Québec Standard 4930-100 entitled Outdoor Lighting - Control of Light Pollution in relation to the amount of light emitted, its orientation, spectral composition and duration of use of the lighting fixtures used in order to mitigate the environmental effects of the Project caused by the emission of light, while respecting operational requirements for health and safety. These measures include:
  - Reduce light spill into the sky and water by using fixtures that produce dim, uniform illumination that meets actual lighting needs, and direct light only onto surfaces that needs to be lit;
  - Ensure that the fixtures do not give off light at angles greater than 90 degrees, and install fixed lights to avoid light spill out of the spaces to be lit;
  - Control the time period and duration of lighting use by installing timers and motion detectors, and by encouraging workers to turn off lights. Plan lighting to ensure that it is at optimal levels for worker

and equipment safety while also minimizing light output. Turn off light sources in areas where lighting is not required at all times;

- Install outdoor lighting fixtures that minimize sources of ultraviolet, red and white light and have a correlated colour temperature between 1800 and 3000 Kelvin;

- Implement an employee awareness and training program. Make workers aware of the presence of migratory bird nests or bird that is a species at risk and what to do if a nest is discovered.

Need for Follow-up and Follow-up Requirements

To verify the predicted effects on birds and their habitat, including species at risk, and the effectiveness of the proposed mitigation measures, the Agency recommends that the Proponent implement follow-up programs. Environment and Climate Change Canada is of the opinion that the information presented by the Proponent on the follow-up program is brief, and that a more detailed version should be developed and submitted prior to the commencement of construction. Follow-up programs should include the following requirements:

- Develop, prior to construction and in consultation with Environment and Climate Change Canada and First Nations who wish to do so, the final and consolidated version of the monitoring program for birds (including species at risk). This program will have to identify, among other things, the activities or operations that are likely to have an effect on species at risk and, for each of these, determine the measures to be implemented to reduce nuisance or disturbance. The program will need to be updated periodically to take into account changes in regulations, such as the review of the status of wildlife species by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) or the Species at Risk Act. Implement additional mitigation measures if required. The program shall assess the contribution of the Project to cumulative effects by taking into account, to the extent possible, any available external data, including data from other projects in the region;
- Prior to construction and in consultation with Environment and Climate Change Canada and interested First Nations, develop a follow-up program for birds (including migratory birds and birds that are listed species at risk) that frequent the study area to validate whether species at risk are present and using the area around it. Implement this program during operations and closure. Conduct initial follow-up prior to the start of construction (year 0 – reference year), during the first year of operation, and then every five years for the entire operation and closure period (years 6, 11, 16, 21, etc.). In implementing the follow-up program, the Proponent shall :
  - Devise an inventory plan based on the potential habitats of the various target species available around the infrastructure. Target species are those that have been inventoried or for which potential habitat is available in the study area:
    - Conduct a daytime field inventory using listening points for Evening Grosbeak, Canada Warbler, Eastern Wood-pewee, Rusty Blackbird, and Barn Swallow;
    - Conduct an evening field inventory in June for the Common Nighthawk and the Eastern Whip-poor-will;

- Forward follow-up reports to the Agency, Environment and Climate Change Canada, and First Nations. Follow-up reports should contain the following elements: results, analysis of results, and contingency measures;
- Develop and implement modified or additional mitigation measures if follow-up results demonstrate that such measures are required to mitigate the environmental effects of the Project on birds, their eggs, and their nests;
- Assess the contribution of the Project to cumulative effects by considering, to the extent possible, any available external data, including that from other projects in the region.

- Prior to the operational phase and in consultation with Environment and Climate Change Canada, develop a follow-up program to specifically address the effect of ground flares on avian wildlife, and implement the program during the operational phase on birds (including migratory birds and birds that are listed species at risk). Conduct follow-ups during the spring migration period (between the end of March and the end of May) and the fall migration period (beginning of September and beginning of November), once a week for approximately seven weeks per season, starting in the first year of flare use. In implementing the follow-up program, the Proponent shall :
  - Forward follow-up reports to the Agency, Environment and Climate Change Canada, and First Nations;
  - In the event of emergency use of flares at night, visit the site to check for the presence of dead birds on the ground. If any are found, identify and count them;
  - Develop and implement modified or additional mitigation measures if follow-up results demonstrate that such measures are required to mitigate the effects of flares on birds;
  - Prior to the end of the first year of operation, determine, in consultation with the parties consulted in the development of the follow-up program and based on the results of the monitoring, whether additional monitoring is required for a subsequent year. If additional monitoring is required, update the monitoring program and implement the additional monitoring program requirements.
- Prior to construction and in consultation with Environment and Climate Change Canada and interested First Nations, develop and implement a follow-up program during construction and operation to assess the effect of noise on use of the area by nesting birds. Monitor at least twice a year during the nesting season. Monitoring should begin half an hour before sunrise and last for a maximum of five hours. As part of the implementation of the monitoring program:
  - Determine the number and placement of sampling stations in order to assess the potential loss of peripheral habitat associated with ambient noise. Position the stations according to the final site plan and according to the expected noise propagation models;
  - Begin monitoring during the nesting period prior to the start of construction;
  - Ensure that the selected mornings meet the optimal weather conditions for such an inventory: low or no lower wind and no or low precipitation (less than 3 millimeters);
  - Develop and implement modified or additional mitigation measures if monitoring results demonstrate that they are necessary to mitigate the environmental effects of project noise on breeding birds;

- Assess the contribution of the Project to cumulative effects by considering, to the extent possible, any available external data, including that from other projects in the region;
- Forward follow-up reports to the Agency, Environment and Climate Change Canada, and First Nations.

5.6 Terrestrial Fauna at Risk

The Project could result in residual effects on certain terrestrial species at risk other than birds (section 5.5) due to the destruction or alteration of their habitat. However, the Agency is of the opinion that the Project is unlikely to cause significant adverse environmental effects on those species when taking into account the implementation of the mitigation and follow-up measures recommended in the section 5.6.2.

In determining the significance of the effects on this component, the Agency assessed, in particular, whether compensatory or protective measures could be put in place so as not to adversely affect the maintenance, management or recovery of one or more of those species.

5.6.1 Analysis of Potential Effects and Proposed Mitigation Measures

Description of the Component

Terrestrial species at risk[69] likely to be affected by the Project include three species of bats and two species of turtles that are protected under the *Species at Risk Act* (SARA) or have a status proposed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) (Table 16). Environment and Climate Change Canada confirms that no critical habitat for species at risk is present in the limited study area (Environment and Climate Change Canada, 2021).

[69] Only species at risk under SARA are discussed in this report. According to information provided by the Proponent, nine species with special status (provincial only) may also be present in the Saguenay-Lac-Saint-Jean region. Those species has been assessed under the Government of Quebec's environmental assessment process.

Table 16: Terrestrial species at risk present or potentially present in the local and limited study areas

Species		Status	
Common name	Scientific name	*SARA* (Schedule 1)	COSEWIC
Mammals			
Northern Myotis*	*Myotis septentrionalis*	Endangered	Endangered
Little brown Myotis*	*Myotis lucifugus*	Endangered	Endangered
Tri-colored Bat*	*Perimyotis subflavus*	Endangered	Endangered
Herpetofauna[70]			
Eastern painted turtle	*Chrysemys picta picta*	Special concern	Special concern
Snapping turtle	*Chelydra serpentine*	Special concern	Special concern

* Presence confirmed (species in blue) by inventories carried out by the Proponent.

Woodland caribou, wolverine and wood turtle, other species at risk protected under the *Species at Risk Act*, are potentially present in the Saguenay-Lac-Saint-Jean region, but not in the vicinity of the Project.

During the acoustic inventories carried out by the Proponent, the northern myotis and the little brown myotis were in 19% of the recordings, while the tri-colored batwas in 2% to 3% of the recordings. In view of the diverse habitats that may be used by these three species, the entire study site can be considered potential habitat. Potential habitats are also available in the Cap-à-l'Ouest area and on the south shore of the Saguenay River (WSP, January 2020). In particular, the little brown myotis, the northern myotis and the tri-colored bat may use trees as roosting sites. Optimal roosting habitat[71] for bat species in the limited study area is estimated at 65.39 hectares (WSP, January 2020). Based on the inventories, underground openings that could be used as hibernacula[72] were not detected in the study area or in the immediate vicinity (WSP, January 2020). The Proponent states that the potential presence of hibernacula in some areas could not be completely ruled out (potential uncertain), but in view of the type of rock, the likelihood of bat hibernacula being present is low (WSP, January 2019). The presence of maternity wards has not been confirmed in the limited study area (WSP, January 2019, and WSP, January 2020). However, the Proponent stated that buildings that could house maternity colonies are present near the site (WSP, January 2020). Environment and Climate Change Canada notes that some wooded areas within the limited study area may have the potential for snags, which could serve as maternity or roosting sites for bats. These structures are considered residences for the northern myotis, the little brown myotis and the tri-colored bat and are of great importance in the lifecycle of these species.

[70] All reptiles and amphibians found in an area (for example, turtles, snakes, frogs, salamanders).
[71] Areas likely to be most important for these bat species. Optimal habitats include a combination of elements of interest to these species, which increases the likelihood of a roosting site.
[72] Locations where bats gather in winter, such as a cave.

The snapping turtle likes a weak current, muddy or sandy bottoms and an abundance of aquatic vegetation. The eastern painted turtle, on the other hand, is rather versatile and uses different wetlands. The limited study area includes 38.70 hectares of potential eastern painted and snapping turtle habitat (WSP, January 2020). The two species were not observed by the Proponent in the study area. Nevertheless, they could be present.

Potential Effects

Project's activities that may result in effects on terrestrial fauna at risk include site preparation (clearing, stripping, excavation, backfilling, culvert construction); the use, movement, refuelling and maintenance of machinery; and the use, storage and handling of hazardous materials or non-hazardous residual materials.

During the construction phase, the development of the various work areas would result in a total encroachment of 101.6 hectares (15.1 hectares of temporary and 86.5 hectares of permanent encroachment) of terrestrial habitats and 9.5 hectares of wetlands. In addition, permanent encroachment of approximately 1.36 hectares is planned on the shoreline of the outlet of unnamed lake no. 2 (CE-03) by the various proposed facilities.

The Proponent indicates that 2.39 hectares of the optimal roosting area for bat species (65.39 hectares) would be permanently affected by the Project, and 0.17 hectares would be temporarily affected, which is less than 4% of the optimal roosting habitat (WSP, January 2020). No further habitat loss is expected during the operation phase. Bats may, to some extent, frequent the wetlands that would be affected by the Project, particularly for feeding purposes (WSP, January 2020). If maternity wards are present, the habitat losses could cause bat mortality.

For turtles, 3.77 hectares of potential limited-area habitat would be affected by permanent facilities and less than 0.01 hectares by temporary facilities (WSP, January 2020). No further habitat loss is expected during the operation phase. Initial site preparation could also increase suspended solids emissions on a temporary, limited basis in the freshwater habitat used by turtles. Contamination of bat and turtle habitat could also occur in the event of a break or accidental spill (hydrocarbons, hazardous materials, pollutants). Accidents and malfunctions are discussed in section 6.1.

The Pekuakamiulnuatsh First Nation expressed concern about the loss and fragmentation of forest habitat at the Project site and about the light and sound nuisances to which the species present would be exposed (Pekuakamiulnuatsh Takuhikan, June 2019). The Innu First Nations are also concerned about the fact that, during the inventories carried out by the Proponent, there were no bat listening stations at the proposed plant site (Pekuakamiulnuatsh Takuhikan, Innu Essipit First Nation Band Council and Pessamit Innu Band Council, October 2020). The Huron-Wendat Nation also expressed concern about the potential effects of port facilities on bat migration due to the heavy use of the Saguenay River corridor during the migration period. The Nation is of the opinion that the Proponent should have discussed all parts of the bat lifecycle in its assessment (Conseil de la Nation huronne-wendat, June 2019). However, Environment and Climate Change Canada is of the opinion that all potential direct and indirect environmental effects of the Project on species at risk have been satisfactorily described by the Proponent (Environment and Climate Change Canada, 2021).

In addition, for all phases of the Project, wildlife species could be disturbed by noise, traffic, the presence of machinery, and artificial night lighting. These activities could result in temporary avoidance of the work area by wildlife and collisions or even fatalities. In particular, artificial night lighting could increase predation of turtles and bats and raise mortality rates. During night feeding periods, bats would be more likely to collide with moving vehicles due to the attraction behaviour generated by artificial lighting, which would increase the risk of mortality. Conversely, tri-colored bat may take advantage of certain types of lighting (for example, blue and white spectra) that attract the insects they feed on.

With respect to the shipping corridor, the Proponent states that the increase in marine traffic is not expected to have a significant effect on bat or turtle species at risk since the corridor is not a favourable habitat for them. Environment and Climate Change Canada is of the opinion that the presence of potential habitats cannot be excluded, but believes that marine navigation is not likely to result in significant impacts on species at risk (Environment and Climate Change Canada, 2021).

Mitigation and Follow-up Measures Planned by the Proponent

The Proponent has planned a number of mitigation measures during the construction phase that would reduce habitat loss or degradation, disturbance and the risk of collision with wildlife. These measures include marking off deforestation areas, planning noisy work from 7 a.m. to 7 p.m. on weekdays, minimizing lighting, and controlling the speed of transporters (WSP, January 2019). The Proponent is also committed to deforesting outside the bird breeding period (May 1 to August 15), which would also cover the bat breeding period (June 1 to July 31). However, if there are schedule changes and it becomes impossible to work outside the restriction period, the Proponent states that it will carry out an inventory beforehand to identify the potential presence of bat maternity sites and, should any be discovered, it will implement mitigation measures (those measures are discussed in the “Need for follow-up and follow-up requirements” section below) (WSP, January 2020).

During the operation phase, the planned measures are related to the use of artificial night lighting. In particular, they cover the use of directed lighting with a beam spread of no more than 90 degrees and reduction of the luminous flux to what is necessary to ensure the safety of workers and equipment.

The Proponent has also planned specific measures for watercourses to protect herpetofauna, including turtles. In particular, the Proponent plans to prohibit fording or driving in the littoral zone, and there are measures in the event of a spill, which are discussed in section 6.1 - Accidents and malfunctions.

A follow-up program is planned for the construction and operation phases to assess the effects of noise and light on bats’ use of the area. The follow-up would take place during the bat breeding period, including two visits per month in June and July. For turtles, the Proponent plans to carry out a follow-up after completion of the reconfiguration work on watercourse CE-03 (WSP, January 2020).

In its submission, the Huron-Wendat Nation mentioned that the Proponent should apply the precautionary principle and take compensation measures for each species at risk. In particular, the Nation is concerned about decreases in bat populations and requests that measures be taken to monitor the Project’s effects on terrestrial fauna, including bats (Conseil de la Nation huronne-wendat, June 2019). The Pekuakamiulnuatsh First Nation stated in its submission that it would like to see a follow-up program for the terrestrial biological

environment (particularly on the effects of sound) and a compensation plan to install roosting boxes for bats in the study area (Pekuakamiulnuatsh Takuhikan, 2019).

Environment and Climate Change Canada is of the opinion that the mitigation measures planned by the Proponent will minimize the residual environmental effects of the Project on the three species of bats at risk as well as on the two species of turtle, as long as all the mitigation measures previously stated are implemented in a timely manner (Environment and Climate Change Canada, 2021).

5.6.2 Agency Analysis and Conclusions on Residual Effects

With the implementation of the mitigation and follow-up measures identified below, the Agency is of the opinion that the Project is unlikely to cause significant adverse environmental effects on the terrestrial fauna species at risk likely to be affected by the Project, namely three species of bats and two species of turtles.

Analysis of the Effects

The identification and the description of potential effects appear complete and consistent with the threats identified in the recovery documents (Environment and Climate Change Canada, 2021). However, Environment and Climate Change Canada is of the opinion that some environmental effects will remain despite the implementation of mitigation measures.

Considering the recovery strategy for the little brown myotis, the northern myotis and the tri-colored bat (Environment and Climate Change Canada, 2018), white-nose syndrome, a fungal infection, is the main threat to these three species. In areas where bat populations have declined significantly as a result of the syndrome, any additional mortality, even if it affects a small number of individuals, may have an impact on the survival and recovery of local populations (Environment and Climate Change Canada, 2018).

Acoustic and visual inventories carried out by the Proponent did not detect the presence of bat hibernacula or maternity wards within a one-kilometre radius of the proposed plant site. Hibernacula are considered critical habitat for bats under the *Species at Risk Act*. Since bats are opportunistic in their choice of habitat, uncertainties remain for some areas that could not be fully inventoried because they were inaccessible. In addition, the acoustic inventory conducted by the Proponent showed that bats do frequent the site. Hence, the construction work and operation phase activities are likely to cause disturbance to diurnal and nocturnal bats, particularly due to noise and artificial light.

A small proportion of the bats optimal roosting habitat would be affected by the Project (less than 4%). However, the entire site may constitute potential habitat. Since potential habitats for these species, including part of the optimal roosting habitat, could be affected by the Project, since other disturbances could affect them (light, noise, collision) and since their presence was detected by the Proponent during the inventories, the Agency is of the opinion that the Project could have adverse effects on the little brown myotis, the northern myotis and the tri-colored bat. Environment and Climate Change Canada notes that the risk of mortality would be accentuated if bats were present during clearing activities, particularly if a maternity was present. The Proponent would implement certain mitigation measures. Environment and Climate Change Canada is satisfied with the mitigation measures proposed to reduce the effects on species at risk and their habitats during all phases of the Project. However, the measure to carry out inventories, should clearing work

be carried out during the species' breeding period, raises uncertainties as to its effectiveness. Locating maternity colonies in the natural environment is a complex and difficult task, especially over a large area. If this is the case, Environment and Climate Change Canada considers that the Project is likely to cause adverse effects on bats, despite the monitoring proposed by the Proponent. Environment and Climate Change Canada believes that this should be an exception and a last resort.

According to the Management Plan for the Snapping Turtle (Environment and Climate Change Canada, February 2020), its delayed maturity and potential threats to its habitat make the species vulnerable to population decline. Threats include habitat loss or degradation, direct mortality from boat strikes, road mortality in areas adjacent to wetlands, and bycatch in commercial fisheries.

For the eastern painted turtle, the Agency notes that anthropogenic sources of mortality include vehicle mortality (road vehicles, trains, off-road vehicles, boats), habitat loss, and displacement by or competition with invasive species (COSEWIC, 2018).

Since potential habitats for the snapping turtle and eastern painted turtle could be affected, the Agency is of the opinion that the Project could result in effects on these species and their habitats, even though their presence was not detected by the Proponent during the inventories. However, it is the Agency's view that the mitigation measures proposed by the Proponent would partially reduce those effects, provided that all of the above mitigation measures are implemented in a timely manner.

Conclusion

With the implementation of the key mitigation measures indicated below, the Agency's assessment is that the Project's residual effects on terrestrial fauna at risk would be moderate, based on the environmental impact assessment criteria in Appendix A and the following findings:

- The magnitude of the Project's residual effects on terrestrial species at risk is medium, since effects are expected, but measures could be put in place so as not to adversely affect the maintenance, management or recovery of one or more of these species.
- The extent is site-specific, since the effects are limited to the Project site, and the duration ranges from medium to long term. The duration would be moderate for some effects since they would only occur during the construction phase, i.e., for a period of approximately five years. However, the disturbance and habitat loss would continue throughout the operation phase and would therefore be of long duration.
- The Project's residual effects would be continuous and partially reversible over time on species and would be continuous and irreversible on their habitat.

Determination of Key Mitigation Measures

In addition to the measures proposed in sections 5.3 - Fish and fish habitat, 5.4 - Vegetation and wetlands and 5.5 - Birds and their habitats, the Agency has identified the key mitigation measures required to ensure that the Project does not cause significant adverse environmental effects on terrestrial fauna at risk. It took into account the mitigation measures proposed by the Proponent, the opinion of government experts, and comments from First Nations consulted and the public.

The key mitigation measures are as follows:

- Not undertake any activities associated with the construction or operation of the Project that would interfere with the denning and suckling periods of juvenile bats, which is the period from June 1 to July 31 inclusive of each year. If it is not technically or economically feasible to carry out any activities that may affect the denning and suckling periods outside of this period in any given year, submit a justification to the Agency and develop, to the satisfaction of Environment and Climate Change Canada, and implement additional mitigation measures to avoid adverse effects on bats;
- Install, prior to construction and in consultation with First Nations, artificial bat roosts at least one kilometre away from areas where construction activities will take place. Maintain the roosts throughout the life of the Project. Have the roosts installed by a qualified person;
- Participate, at the request of the relevant authorities and in consultation with willing First Nations, in regional initiatives or any Saguenay Port Authority initiative related to the monitoring, assessment or management of cumulative adverse effects on terrestrial wildlife, including birds (see section 5.5 of this report) and bats, in the event that such initiative(s) are undertaken during the construction or operation of the Project Implement any technically and economically feasible mitigation measures or follow-up programs identified through any regional initiatives that are the responsibility of the Proponent.

Need for Follow-up and Follow-up Requirements

To verify the predicted effects on terrestrial fauna at risk and the effectiveness of the proposed mitigation measures, the Agency recommends that the follow-up program include the following requirements:

- Develop, prior to construction and in consultation with Environment and Climate Change Canada and willing First Nations, the final and consolidated monitoring program for terrestrial wildlife at risk. This program shall identify activities or operations that may affect species at risk and, for each activity or operation, the measures to be implemented to ensure that disturbance is reduced. The program shall be updated periodically to take into account changes in regulations, such as the review of the status of wildlife species by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) or the Species at Risk Act. The program shall provide for the implementation of additional mitigation measures as necessary;
- Before construction, develop a follow-up program in consultation Environment and Climate Change Canada and willing First Nations, to verify the accuracy of the environmental assessment and to determine the effectiveness of the mitigation measures related to the Project's adverse environmental effects on the northern myotis, the little brown myotis and the tri-colored bat and herpetofauna. In particular, the program must identify additional mitigation measures or compensation measures in the event that the measures taken prove ineffective. Implement the follow-up program during construction and during, at least, the first three years of operation. In implementing the follow-up program:
    - Follow-up on the effect of noise and nighttime light (intrusive light) on bats' use of the area. This follow-up must be carried out during the bat breeding period. Carry out acoustic follow-up four times a year during this period, i.e., two visits in June and two visits in July, in the evening starting at dusk, ideally two weeks apart;

- Monitor the use of the artificial dormitories by bats;
- Carry out a herpetofauna follow-up after the completion of reconfiguration work on watercourse CE-03. Water quality readings must be taken four times a year to assess potential impacts on the aquatic components of the herpetofauna. A reference state must be carried out before the construction phase and would continue one year after the end of the work;
- Submit the follow-up report to the Innu First Nations of the Essipiunnuat, the Pekuakamiulnuatsh, the Pessamiulnutsh, and the Huron-Wendat Nation, the Agency and Environment and Climate Change Canada;
- Prior to the end of the third year of operation, determine, in consultation with parties consulted in the development of the follow-up program and based on the results of the monitoring, whether additional monitoring is required for bats during operation. If additional monitoring is required, update the monitoring program and implement the additional monitoring program requirements;
- Assess the Project's contribution to cumulative effects by considering, to the extent possible, any available external data, including that from other projects in the region.

5.7 Current Use of Lands and Resources for Traditional Purposes

The Project could have residual effects on the current use of lands and resources for traditional purposes, particularly for the Innu First Nations of the Essipiunnuat, the Pessamiulnutsh and the Pekuakamiulnuatsh and for the Huron-Wendat Nation. Those effects would be mainly associated with shipping, which could affect the quality of the overall experience surrounding fishing and boating for traditional purposes and cause some disturbances in the First Nations' access to the land. Since the shipping generated by the Project would be combined with that of other existing or proposed projects in the region, the Agency believes that the effects on traditional uses would also be cumulative in nature. The Project would also have residual effects, although not significant, on certain resources, such as fish or migratory birds, that support traditional uses.

The Agency is of the opinion that the Project's effects and the cumulative effects on current use of lands and resources are not likely to be significant.

In determining the significance of effects on this component, the Agency assessed, among other things, whether the Project could result in changes to resources under current use for traditional purposes and changes to conditions of practice such as access or experience on Aboriginal lands. The following subsections outline the information considered in the Agency's analysis.

5.7.1 Analysis of Potential Effects and Proposed Mitigation Measures

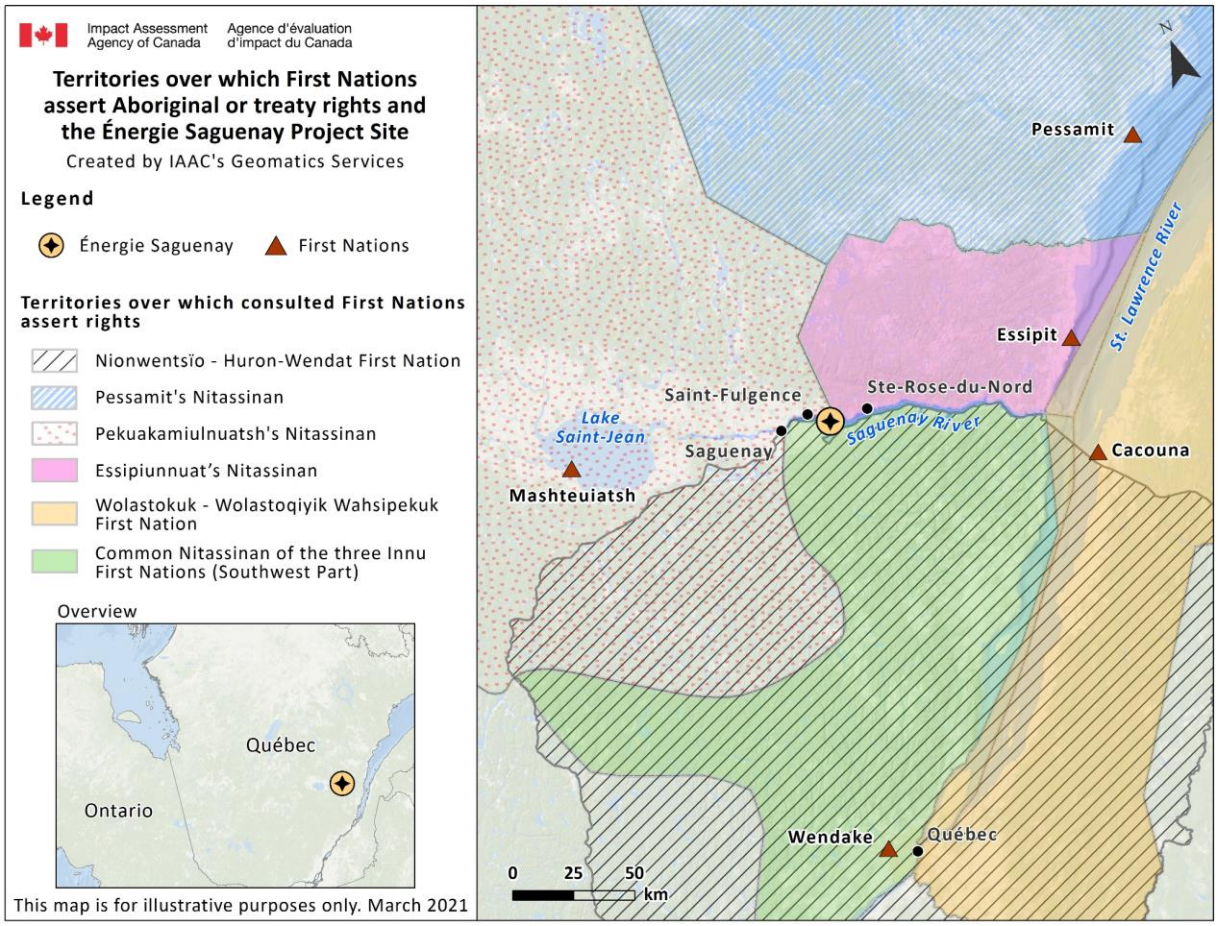
Description of the Component

Current use of lands and resources for traditional purposes refers to any practice or activity that is part of the distinctive culture of an Indigenous group and has been carried on by that group over a period of time from the recent past to the present. This may include activities such as hunting, fishing, trapping, cultural or traditional uses of the land like harvesting medicinal plants or using sacred sites. In the context of an environmental assessment, the term “current use” refers to how the use of lands and resources may be affected during the lifecycle of the Project (pre-construction, construction, operation, decommissioning and closure). The Agency also considers uses that may have ceased as a result of external factors but could reasonably be expected to resume once conditions have been restored.

In connection with the Énergie Saguenay Project, the Agency reviewed information concerning the above-mentioned Innu First Nations and the Huron-Wendat Nation. The Agency has not received any information regarding the current use of lands and resources for traditional purposes in the study area by members of the Wolastoqiyik Wahsipekuk First Nation.

The environmental effects assessment criteria and the significance determination grid used by the Agency are presented in Appendix A.

Figure 11: Location of the traditional territories of the First Nations consulted



Source: Impact Assessment Agency of Canada, March 2021

Description of Current Uses by the Innu First Nations

The Saguenay River, its southwestern banks and the territory south of it, up to its mouth, are the subject of a joint land claim by the three Innu First Nations. The site of the industrial complex planned by the Proponent is in that area. The portion of the St. Lawrence Estuary from east of the mouth of the Saguenay River to the pilot station at Les Escoumins is located more directly in the Nitassinan[73] of Essipit, as are the northeastern banks of the Saguenay River (see Figure 11).

Historical occupation of the Saguenay region by the Innu is reflected in more than 100 historical references, involving both the toponymy and the existence of ancient portage trails, hunting sites or habitation sites. The Innu used the Saguenay River to fish, travel and reach inland territories. For the portion of the St. Lawrence Estuary located in the study area, fish and shellfish harvesting in summer, seal hunting in winter, and

[73] In Innu Aimun, Nitassinan means the traditional territory occupied by the Innu.

migratory bird hunting in spring were an important part of the Innu activity cycle (Transfert Environnement et Société, April 2018).

With a few minor differences, current use of the land by the Innu follows the same modes of occupation and resource exploitation.

The Essipiunnuat, the Pessamiulnutsh and the Pekuakamiulnuatsh do not currently use the industrial site and the immediate vicinity of the Project (limited and local study areas). Migratory bird hunting is apparently practised only by some Pekuakamiulnuatsh upstream of the site.

In the Saguenay River sector, summer food fishing is practised by the Essipiunnuat and the Pekuakamiulnuatsh. Some Essipiunnuat also practise winter food fishing for redfish, rainbow smelt and herring. Anse à Benjamin and Sainte-Rose-du-Nord are two valued areas for this activity. The Pessamiulniuat do not currently use the river for their traditional activities (Conseil des Innus de Pessamit, 2019).

From the mouth of the Saguenay River to Les Escoumins, along the shoreline that is part of the Nitassinan of Essipit, the resources exploited by the Essipiunnuat are marine species (harp seal, capelin, anadromous brook trout, herring, cod, Atlantic salmon, smelt, pout, halibut, eel), crustaceans, molluscs (soft-shell clams) and migratory birds (geese, duck species). In the case of salmon, the Innu have managed to maintain a community fishery despite the commercial overexploitation of this species, but they have had to implement certain conservation measures, such as the removal of community salmon nets off Essipit. Spring hunting of migratory birds is practised mainly between Pipunapi cove (Cap-de-Bon-Désir) and Les Escoumins and at Les Bergeronnes. The winter harp seal hunt is carried out mainly near Essipit. Most marine species activities and migratory bird hunting are carried out from the shore or close to shore, although seal hunting sometimes takes place in the north channel of the St. Lawrence, which begins less than two kilometres from the Essipit reserve. Small boats (rowboats and canoes) are generally used for offshore seal hunts.

The Innu First Nations of Essipiunnuat and Pessamiulnutsh also use the area of the mouth of the Saguenay River for commercial fishing of green sea urchin and snow crab and for marine mammal watching cruises (Essipit) (Section 5.9, Socioeconomic Conditions). As for the Pessamiulnutsh, their traditional practices and their other commercial activities take place mainly beyond Les Escoumins, outside the extended study area.

For the Innu, all traditional activities have a social, cultural and spiritual character, like all Innu Aitun[74] practises, and serve to transmit knowledge between generations. For the Essipiunnuat, the sectors of heavy shoreline use and the fishing areas, such as Îlets boisés, Les Bergeronnes and Les Escoumins Bay, are special areas for the intergenerational transmission of knowledge.

[74] Innu Aitun is an Innu term that refers to traditional practices in all their forms.

Description of Current Uses by the Huron-Wendat Nation

The Saguenay region constitutes the eastern limit of Nionwentsio, the main ancestral and customary territory of the Huron-Wendat Nation (Figure 11). According to the Nation, the Huron-Wendat's historical occupation was concentrated more specifically from the mouth of the Saguenay River to the Chicoutimi area, a territory where they travelled, exploited various resources and established camps. The activities practised centred on the exploitation of marine resources, especially phocids. Beavers, berries and other resources were also harvested.

The Huron-Wendat Nation told the Agency that some of its members were currently using the land around the Project site and the entire Saguenay River. The following activities are practised there by members interviewed for a survey conducted by the First Nation in 2020:

- boating;
- marine mammal watching;
- fishing at the mouth of the Saguenay River;
- fishing for various species, especially Atlantic salmon and sea trout, at the mouth of Rivière à Mars in Baie des Ha! Ha!;
- snow goose hunting at Île-Verte, at the mouth of the Saguenay River.

The Huron-Wendat Nation indicated that the quality of Wendat users' overall experience while practising their activities is just as important as the activity itself. Hence, peace of mind and a sense of well-being and safety are necessary conditions for pursuing the activities, according to the First Nation.

No practices were identified by the Huron-Wendat Nation on the Project's land-based infrastructure site. As in the case of the Innu, this absence of activity may be due to the fact that it is an industrial area close to a municipalized territory and therefore not conducive to the practice of traditional activities.

Description of Current Uses by the Wolastoqiyik Wahsipekuk First Nation

The Wolastokuk, a territory claimed by the Wolastoqiyik Wahsipekuk First Nation, covers the St. Lawrence Estuary and includes the Saguenay River and part of its banks up to the vicinity of Rivière Éternité (Figure 11). This sector has special historical significance for the First Nation since it was used to reach important fishing and inter-Nation trading areas. The First Nation provided no information to the Proponent or the Agency regarding its members' current use of this sector.

Potential Effects

Changes in Indigenous Fishing and Hunting Resources and Activities

The Innu First Nations and the Huron-Wendat Nation are concerned, principally, about the effects on the land and on the abundance, diversity and quality of resources that could be caused by the increase in marine traffic, underwater noise, ambient noise and the risks of soil and water contamination. The First Nations are also concerned about the potential effects of shipping generated by the Project on the beluga whale, a

species of great cultural importance, particularly for the Innu First Nations and the Wolastoqiyik Wahsipekuk First Nation. The beluga whale, in particular, has been part of the Innu shoreline resource exploitation system for thousands of years. For the Innu First Nations, the species is an integral part of the Innu Aitun and is associated with their cultural heritage (WSP, June 2020). For this reason, and because the beluga has not been hunted for over a century, the effects on Indigenous cultural heritage related to this species are examined in Section 5.8.2.

Concerning fish and fish habitat, some travel or migration corridors of species fished by First Nations (American eel, Atlantic salmon, rainbow smelt, anadromous brook trout, capelin) could be modified because of the presence of the Project's marine infrastructure (platforms and walls). However, according to Fisheries and Oceans Canada, these changes in the direction and speed of the currents in the area of the proposed terminal would be small compared to existing conditions. The fish species using the area are adapted to the variability that could be observed following the construction of the terminal, so no significant impact on their migration is anticipated. As mentioned in Section 5.3, the Agency believes that the Project is not likely to have significant effects on aquatic resources currently harvested by First Nations.

With regard to shipping, in addition to the risk of accidents and malfunctions, underwater noise and ballast water discharge are sources of potential effects on aquatic wildlife, including fish species harvested by First Nations (WSP, January 2019). The Pekuakamiulnuatsh First Nation has expressed concern about routine and incidental water contamination and its effects on its members' consumption of resources, including salmon, sea trout, and migratory birds (Pekuakamiulnuatsh Takuhikan, 2019). According to Fisheries and Oceans Canada, and based on available information, it is unlikely that increased shipping will result in significant effects on fish and fish habitat, although there is still little information on the potential effects of shipping on fish communities in water bodies as large as the St. Lawrence Fjord and Estuary. The presence of additional vessels on the Saguenay River could also increase the risk of introducing invasive alien species (a component discussed in Section 5.3 - Fish and Fish Habitat) that could pose a threat to native species. However, the Agency is of the opinion that the laws and regulations governing the management of ballast water and the follow-up presented in the section 5.3.2 of this report would ensure proper management of ballast water and reduce the risk of contamination and introduction of invasive alien species in the Saguenay River.

Concerning harp seals, a resource hunted by the Essipiunnuat in the Estuary, are mainly present during the winter. According to Fisheries and Oceans Canada, the vessels associated with the Project would travel along the main shipping corridor in this sector and should therefore not affect ice conditions compared to existing conditions. It is unlikely that shipping would result in significant effects on harp seals in the area.

As mentioned in Section 5.5 - Birds and Bird Habitat, no significant adverse effects are expected on migratory birds hunted by First Nations. The Project's potential effects on birds are mainly related to the loss of habitat on the Project site, but the main forest species affected are not hunted by First Nations. According to Environment and Climate Change Canada, noise, vibration and light from the plant and marine infrastructure could have an effect on birds, including migrating birds, by attracting and diverting them. Depending on the intensity of the disturbance, certain species could flee, abandon or even avoid certain sectors, and this during all seasons, including the hunting season. These behavioural changes could be observed in the species that frequent certain sectors of the Project site and its immediate vicinity during migration (mainly spring migration), namely Canada geese, Snow geese, American black ducks, Mallards and Common goldeneye. Environment and Climate Change Canada is of the opinion that the mitigation measures that would be put

in place would limit the negative effects of the Project on migratory bird populations, including species of interest for hunting. Regarding the increase in marine traffic, potential effects on waterfowl are associated with the risk of accidents and malfunctions, ship-generated waves and the risk of collision (WSP, January 2019). These effects could occur primarily at the mouth of the Saguenay River, but the Agency does not believe that they pose a significant risk to birds.

In general, for resources exploited by First Nations, the more significant risks are related to the potential for oil spills and harmful or potentially hazardous substances. These risks are discussed in Section 6.1, Effects of Accidents and Malfunctions. A spill could have a significant impact on wildlife resources harvested by First Nations. However, Health Canada is not in a position to provide an opinion on potent contamination of country foods due to the lack of information on the toxicological risks involved in the case of a marine spill of fuel. However, with the implementation of mitigation, prevention and control measures and the risk management program, the Project is unlikely to have any significant adverse environmental effects due to accidents or malfunctions.

Land Use, Access and User Experience

The Project's land-based infrastructure site and its immediate vicinity are not currently used by First Nations for traditional, cultural or commercial purposes as the site is in an industrial zone, on municipalized territory, on private land and in close proximity to the urban centres of La Baie and Chicoutimi (WSP, January 2019). Innu First Nations representatives stated that because of the access constraints already present in the vicinity, the Project site does not offer conditions conducive to meaningful use for traditional purposes. The Proponent indicates that it cannot say with certainty that no First Nations member uses the Project area and its immediate vicinity. Potential users could therefore be disturbed during the construction and closure phases by the noise generated by the machinery used and the vehicle traffic on the construction site and the access roads. Since the Innu First Nations and the Huron-Wendat Nation have indicated that their users might travel anywhere on the Saguenay River, there is a possibility that the Project's marine infrastructure zone, which could currently be an area through which First Nations members pass to practise their activities on the river, could no longer be used in the same way. However, this area under the jurisdiction of the Saguenay Port Authority is already subject to restrictions in order to ensure the safety of users and the manoeuvring of tankers is supervised by the Port Authority.

During the operation phase, shipping would be the main source of potential effects on the current use of the land and resources for traditional purposes. The increase in marine traffic on the Saguenay River and in the St. Lawrence Estuary (expected increase of 300 to 400 tanker passages annually) could heighten not only the risk of accidents and collisions but also the risk of accidental spills that could affect certain activities (food fishing, commercial fishing, recreational tourism, migratory bird hunting) practised by First Nations (WSP, January 2019). According to the analysis of the interrelationships between the sources of marine navigation effects and the valued components (WSP, January 2019), the increased presence of ships could affect nearby residents and users of the Saguenay River, including the First Nations, in three ways: by disrupting their recreational or socioeconomic activities, by temporarily altering the landscape and visual ambiance, and by raising concerns about the risk of accidents among some members of the public. Those effects would be felt mainly in the Saguenay River sector, but could also be felt, to a lesser extent, in the St. Lawrence Estuary. Since tankers pass some distance from the shore in this sector and the Innu generally carry out their activities close to shore, the risk of collision and disruption of activities would be lower than on the Saguenay River. However, user concerns about the risk of accidents and spills could remain.

Innu First Nations representatives indicated that the Project's contribution to existing traffic would probably not change access to fishing or excursion sectors, in view of the most recent data on their use of the shoreline (WSP, January 2020). The Huron-Wendat Nation expressed concern about access to the Saguenay River and the safety of its members being jeopardized by heavy marine traffic. If safety is compromised, the Huron-Wendat Nation worries that interest in the practice of customary activities will decline. The Saguenay River is a navigable waterway, and according to the First Nation, maintaining safe access is an indispensable condition for practising its activities. The Huron-Wendat Nation also noted that for some members, such a development project is likely to cause a certain amount of anxiety with regard to the apprehended effects on customary activities and more generally on the integrity of the land. More specifically, the members are concerned about potential shipping accidents that would result in a major ecological disaster.

The quality of the overall experience of the land is also a concern for the Innu First Nations and the Huron-Wendat Nation. The effect that the passage of larger tanker-type vessels might have on the experience of the land and the practice of activities is difficult to describe precisely, according to the Innu First Nations, as it would mainly result from the user's perceptions. With regard to quality of experience, the Huron-Wendat Nation is also concerned about the increase in ambient noise and in the number of people and ships in the Saguenay region.

Concerning the risks of erosion caused by marine traffic, which in some cases may ultimately result in loss of access to the land and to areas of cultural importance for Indigenous peoples, the Proponent notes that the banks of the Saguenay River between its mouth and the planned Project site are not very vulnerable as there are granite cliffs along most of its length (WSP, January 2019). In addition, the shipping corridor is more than 600 metres from the shoreline, too far for ship-generated waves to affect the banks and cause erosion. Hence, the sectors used by the First Nations and the special cultural transmission sectors, notably identified by the Innu First Nations, would not be threatened by erosion due to marine traffic. However, the Innu First Nations pointed out that any impact on those sectors, through contamination or loss of access, would have a collateral effect on the transmission of knowledge.

Cumulative Effects

Although not considered significant, the Project's potential direct effects on the various resources harvested by First Nations would add up and could have a potential cumulative effect on current uses by the First Nations. Furthermore, those effects could combine with the effects that other projects and activities in the region have on the same species. The Pekuakamiulnuatsh First Nation (Pekuakamiulnuatsh Takuhikan, 2019) and the Huron-Wendat Nation in particular expressed concern about the cumulative effects of the various ongoing and planned projects in the Saguenay-St. Lawrence River region on the biotic environment and consequently on their traditional activities. The Pekuakamiulnuatsh First Nation cited the example of waterfowl whose habitats would be affected by the deforestation generated by various projects, forcing birds to relocate[75] and potentially altering the practice of migratory bird hunting by the First Nations. According to Environment and Climate Change Canada, although uncertainties remain, the contribution of the Project to cumulative effects on migratory birds would be low and sufficient forest and wetland habitat suitable for the avian species that use it should remain available at the regional scale to support local populations.

[75] A concern expressed in particular at a meeting with the Agency on January 24, 2019.

Some 15 projects and activities have recently been completed, started or approved in the region (WSP, January 2019, Table 11-3), including the Project to provide rail service to the Grande-Anse marine terminal, various resorts and tourist site projects, and the marine terminal on the north bank. The Proponent's impact statement also notes that 17 regional projects could potentially be carried out in the next few years (WSP, January 2019, Table 11-3), including the BlackRock Metals smelter and the two projects associated with the Project (the power line and the natural gas pipeline). The assessment of potential interactions between major past, present and future projects in the region and a number of physical or biophysical components (visual ambiance, marine mammals, birds and fish in particular) also shows that the effects of these projects could add up and directly or indirectly affect current uses by First Nations (WSP, January 2019). Marine transportation would be primarily involved as well as, more directly for Indigenous current uses, the development of the resort industry.

Thus, the increase in commercial shipping generated by the Project could combine with the traffic generated by other projects in the region. Assuming that all the projects currently planned are carried out, commercial cargo shipping traffic on the Saguenay River could triple in the next few years. In addition to the increase in commercial marine traffic, there has also been an increase in recreational and tourist boating traffic on the Saguenay River over the last several years (see Section 5.9, Socioeconomic Conditions). The Innu First Nations' and Huron-Wendat Nation's access and experience associated with the current use of lands and resources for traditional purposes on the Saguenay River would thus be cumulatively affected by the Project and the marine transportation generated by other projects and activities.

With regard to the Project's land-based infrastructure site, the Huron-Wendat Nation is of the opinion that its members probably used the site in the past and could have continued doing so if the industrial zone had not been developed. The Innu First Nations indicated that the zone does not currently offer conditions conducive to traditional uses, but they provided several pieces of information on past uses in the region, including the presence of an ancient portage trail marked on some 18th century archival maps near the marine infrastructure (Transfert Environnement et Société, April 2018). The Grande-Anse sector was also frequented by Innu doing business with the Chicoutimi trading post in the early 19th century. The Innu gradually abandoned the territories south of the Saguenay River during the 20th century as colonization progressed (WSP, January 2019). Since the Project would be carried out on an already industrialized site and would not affect user experience and access to the land, the Project would not have cumulative adverse effects on them. However, the Project is part of a regional context in which traditional uses by First Nations have been and may continue to be cumulatively affected. The parcels of land making up the industrial zone were acquired gradually over the years, until very recently, by the Saguenay Port Authority. Although there are no formal indications that those lands could have been used otherwise by the First Nations, the progressive expansion of the type of zones and the general increase in the number of projects in the region may contribute to the feeling of deterioration of the environment and the conditions of use, such as access to the land, for traditional purposes by the First Nations.

Mitigation and Follow-up Measures Planned by the Proponent

The Proponent is committed to implementing monitoring of a number of components supporting the First Nations' use of the land and resources: monitoring of the sound environment, underwater noise, the effect of noise and lighting on terrestrial fauna, aquatic vegetation and benthic fauna, marine mammals during construction and operation, birds, terrestrial fauna, water quality and air quality.

During the construction phase, the Proponent is committed to developing and implementing a communication plan to keep the residents of the Saguenay, land users, First Nations, community leaders and municipal authorities informed of the commencement and progress of the work and the ways and means employed to protect the environment and limit nuisances.

During the operation phase, ship manoeuvres in the Saguenay Port Authority's area of jurisdiction will be governed by the Authority's practices and procedures. Outside that area, the Proponent would take measures such as vessel speed restrictions (Section 6.1 - Effects of Accidents and Malfunctions) to reduce the Project's effect on Indigenous communities' use of the territory for traditional purposes. The Proponent also indicated that a publication of tanker passage schedules would be established to facilitate the management of marine traffic on the Saguenay River.

The Proponent has established a joint follow-up committee that includes two representatives from each of the three Innu communities concerned by the Project. There are ongoing discussions with the Huron-Wendat Nation on a comprehensive agreement regarding Project impacts, follow-up, and mitigation and compensation measures, where applicable (WSP, June 2020). Discussions are also underway with the Wolastoqiyik Wahsipekuk First Nation to determine what follow-up the First Nation would like to participate in.

Lastly, the Proponent has made a commitment to the Innu First Nations to institute a specific community follow-up on the effects of marine tanker traffic on their traditional activities.

5.7.2 Agency Analysis and Conclusions on Residual Effects

The Agency is of the opinion that, with the key mitigation measures identified below, the Project is unlikely to cause significant adverse environmental effects on the current use of lands and resources for traditional purposes.

Analysis of the Effects

The Agency does not expect terrestrial and marine infrastructure and marine traffic to have significant effects on the abundance of resources commonly hunted and fished by First Nations.

On the Project site itself, the Project is unlikely to have any effects on access and experience, in part because the Project site and adjoining areas are not currently used by First Nations. The information gathered by the Proponent did not indicate the presence of users in the local study area who could be disturbed, for all phases of the Project.

The Agency is of the opinion that during the operation phase, the increase in marine traffic is the main source of potential effects on the current use of lands and resources for traditional purposes. The increase in the number of vessels and the heightened risk of accidents and collisions could affect First Nations' safe access to their activity areas. The Agency notes that the experience of Innu First Nations members and the Huron-Wendat Nation on the Saguenay and St. Lawrence rivers could be altered by the presence of more and larger vessels. The visual footprint of those vessels, the transformation of the landscape, and users' perception of the safety hazard could have an influence on the use and the pursuit of traditional activities such as fishing and boating. However, the potential effects of the increase in vessel traffic and size on current

uses and user perceptions are difficult to anticipate. The increase in the number of vessels and the potential effects would probably be felt more on the Saguenay River than in the Estuary.

The Agency also considered the fact that the consequences of an accident could be significant for the current use of lands and resources for traditional purposes, particularly in view of the great heritage value attached to the Saguenay River by the First Nations. However, the Agency is of the opinion that, with the application of the mitigation, prevention and control measures and the risk management program, including the emergency response plan, the Project is unlikely to have significant adverse environmental effects due to accidents or malfunctions (Section 6.1 - Effects of Accidents and Malfunctions).

Conclusion

In conclusion, the Agency believes that the Project's potential effects on the current use of lands and resources for traditional purposes would mainly involve changes in First Nations' access and experience associated with increased marine traffic. The Project's effect on the current use of lands and resources for traditional purposes for the Innu First Nations and the Huron-Wendat Nation would be moderate. The Project could alter the conditions of practice of traditional activities and the associated customs and intergenerational transmission of values and knowledge, but it would not compromise current use for traditional purposes. The Agency also notes that the potential disruption of traditional activities and the risk of collision are mainly likely to affect users of the Saguenay River, i.e., the members of the Innu First Nations of the Pekuakamiulnuatsh and the Essipiunnuat and the Huron-Wendat Nation.

The Agency's assessment is based on the environmental effects assessment criteria in Appendix A and the following findings:

- The magnitude of the Project's potential effects would be medium. The presence of vessels could result in change of certain behaviours or even the avoidance of certain areas by users. The effects on overall experience and the more difficult access to the Saguenay River could alter certain behaviours, but current use would not be compromised. For users of the estuary, particularly the Pessamiulnutsh, the intensity of potential effects would be low since little or no change in current use would be expected.
- The extent of the effects would be regional, as marine traffic and its potential effects would go beyond the local study area to the extended study area.
- The Project would have long-term effects for the duration of the operation and would do so intermittently with near-daily vessel traffic. The Project's potential adverse effects on current use by First Nations would be partially reversible, as users' perceptions and the effects on their uses and the intergenerational transmission of the associated values and knowledge may persist over time and not fully recover from the adverse effects caused by the Project.

The Agency understands that the consultation process is not complete and that further information about the current use of lands and resources for traditional purposes and the potential residual effects on it may be forthcoming. Comments from First Nations on this draft report and the potential conditions will be taken into consideration and will assist the Agency in finalizing its conclusions.

Agency Conclusion on Cumulative Effects

The Project would be likely to have effects on fish and fish habitat, marine mammals such as seals, and migratory birds. The Agency is of the opinion that with the aggregation of these potential, though non-significant, effects on resources supporting the practice of traditional activities by First Nations, the Project is likely to have a cumulative effect on the current use of lands and resources for traditional purposes. Those effects on resources could also combine with the effects of other past, present and future projects in the region.

The Agency is of the opinion that the Project is part of a series of activities on the Saguenay River, and that it adds to the overall pressure on First Nations' ability to practise their traditional activities. Shipping is the main source of the Project's direct effects on current uses and could combine with traffic generated by other projects, notably future projects, in the region to cumulatively affect access and experience in the territory of the First Nations using the Saguenay River and, to a lesser extent, the St. Lawrence Estuary and its shoreline.

In the Agency's view, the level of the cumulative effect on the current use of the land and resources would be moderate, as some behaviours could be altered, but the current use would not be compromised (medium magnitude). The other criteria are characterized in the same way as the direct effect: regional in scope, long-term in duration, intermittent in frequency, and partially reversible.

Determination of Key Mitigation Measures

The Agency believes that the following mitigation measures are necessary to ensure that there are no significant adverse environmental effects on the current use of land and resources for traditional purposes:

- Implement key mitigation measures regarding
  - Fish habitat protection, as outlined in Section 5.3.2;
  - Physical and cultural heritage, as outlined in Section 5.8.2;
  - Socioeconomic conditions, as outlined in Section 5.9.2;
  - Marine mammals, as outlined in Section 5.2.2;
  - Birds, as outlined in Section 5.5.2;
  - Accidents and malfunctions, as outlined in Section 6.1.2.
- Consult and involve the Innu First Nations, the Huron-Wendat Nation and the Wolastoqiyik Wahsipekuk First Nation, according to their interests, in determining and implementing compensation measures for these components;
- Communicate Project's activities schedules, changes and updates to the First Nations as soon as the Proponent submits the information to the Agency.

Need for Follow-up and Follow-up Requirements

To verify the predicted effects on the current use of land and resources for traditional purposes and the effectiveness of the proposed mitigation measures, the Agency recommends that the follow-up program include the following requirements:

- With the First Nations that so desire, establish periodic follow-up concerning the design, implementation and evolution of the environmental follow-up program. The follow-up shall include meetings tailored and planned to address the interests and concerns of the First Nations involved in order to discuss the potential effects that may be related to the Project;
- Before construction, develop a traditional activity follow-up program in consultation with First Nations to verify the accuracy of the environmental assessment and to gauge the effectiveness of the mitigation measures addressing adverse environmental effects on the current use of lands and resources for traditional purposes. The Proponent shall determine with each First Nation which activities require follow-up. The Proponent shall consider any additional information that may arise during the life of the Project. In particular, the Proponent shall establish specific follow-up for the effects of marine transportation on the activities of these First Nations, including users' perceptions (including the perception of security risk).

5.8 Physical and Cultural Heritage

The Project could cause residual effects on physical and cultural heritage due to forest clearing, soil disturbance during construction and the addition of tall structures and structures in the marine environment, as well as to navigation in operation.

The Agency is of the opinion that the Project would cause significant adverse environmental effects on the cultural heritage of the Innu First Nations, given the disturbance of marine mammals that would be caused by the tankers, even following the implementation of mitigation, monitoring and follow-up measures.

To determine the significance of effects on physical and cultural heritage, the Agency assessed, among other things, whether the residual effects of the Project would result in the alteration of any special character-defining features of the natural or cultural heritage, or would prevent users from accessing or using any element of physical or cultural heritage or any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.

5.8.1 Analysis of Potential Effects and Proposed Mitigation Measures

Description of the Component

The Agency considers that physical and cultural heritage can include elements such as a land or resource (for example, an artifact, object or place) or a structure, site or thing of historical, archaeological, paleontological or architectural significance that is distinguished from other lands and resources by the value placed on it (Agency, March 2015).

The Project would be located in the visual environment of the Port de Grande-Anse industrial port site, which is to be used for the development of large-scale industries. More specifically, it would be in the eastern portion of the site, near the Métaux BlackRock Inc. iron and ferrovanadium concentrate processing plant. Although this area is under development, the eastern portion of the site is currently wooded and remains relatively untouched by infrastructure. The western side, on the other hand, houses some industrial facilities, including a rail service and the marine terminal. No heritage buildings are located near the Project area.

Since time immemorial, the Saguenay River and Fjord have served as a route for travelling inland and as a meeting place for First Nations. For the Innu First Nations of the Essipiunnuat, the Pekuakamiulnuatsh and the Pessamiulnutsh, the Saguenay Fjord is a site of physical and cultural heritage value. In addition to being a transportation hub for the Innu, the Project area is important from the standpoint of traditional uses and subsistence activities. According to the First Nations, a number of landscape components along the Saguenay River and Fjord carry traces of their history. The importance of these areas is reflected in the existence of Innu place names, such as Pitchita8tchez for the Saguenay River and Ueshkauauaskau for Baie des Ha! Ha! The Saguenay River is important for the Huron-Wendat Nation as well, as it forms the eastern boundary of this First Nations' traditional territory, Nionwentsïo. Wolastokuk, the land claimed by the Wolastoqiyik Wahsipekuk First Nation, also extends to the Saguenay River and along part of its shores, about as far as the Éternité River. The area is of particular historical significance for this First Nation because it was used by their ancestors to reach important fishing spots and locations where trading between Nations took place. The potential effects of the Project on First Nations are addressed in section 5.7 - Current Use of Lands and Resources for Traditional Purposes by Indigenous Peoples and section 7 - Impacts on Aboriginal and Treaty Rights of this report. As the Innu First Nations have pointed out, the beluga is part of their cultural heritage. The potential effects of an increase in marine navigation on the beluga are addressed in section 5.2 - Marine Mammals, including Beluga whales, of this report.

The fjord and the fluvial estuary are identified as an area of aesthetic importance in the land-use planning and development plans of the Ville de Saguenay and the regional county municipality of Fjord-du-Saguenay (WSP, January 2019). In addition, landscape alterations are a major concern raised by the general public. The brief from the Collectif de l'Anse-à-Pelletier confirms that the current natural landscape is of inestimable value to the residents of Anse-à-Pelletier. The Saguenay Fjord is also recognized as a major attraction and a unifying factor in the development of the region's economy and recreational tourism (Tourisme Saguenay-Lac-Saint-Jean, juin 2019; Parc aventures cap jaseux, juin 2019, Collectif de l'Anse-à-Pelletier, juin 2019). The potential effects of project-related landscape alteration on the regional economy and tourism are addressed in section 5.9 - Socioeconomic Conditions of this report.

Lastly, the proposed Project site is located upstream of the Saguenay – St. Lawrence Marine Park, which is managed jointly by the federal and Quebec governments, with the participation of the coordination committee made up of representatives from various fields of activity in the coordination area. The confluence of the St. Lawrence and Saguenay estuaries, where waters from the Great Lakes, the Saguenay basin and the Atlantic Ocean meet, is recognized as an exceptional region from an ecological point of view. The particular oceanographic conditions of the confluence zone, the unique character of the Saguenay Fjord, the beauty of the landscapes, the great biodiversity of the region and the presence of belugas are exceptional characteristics of the marine park. The marine park is located alongside Quebec's Fjord-du-Saguenay National Park, which is managed by the Société des établissements de plein air du Québec. Both parks are part of the physical heritage and are considered to be of great value in terms of science, conservation and natural beauty.

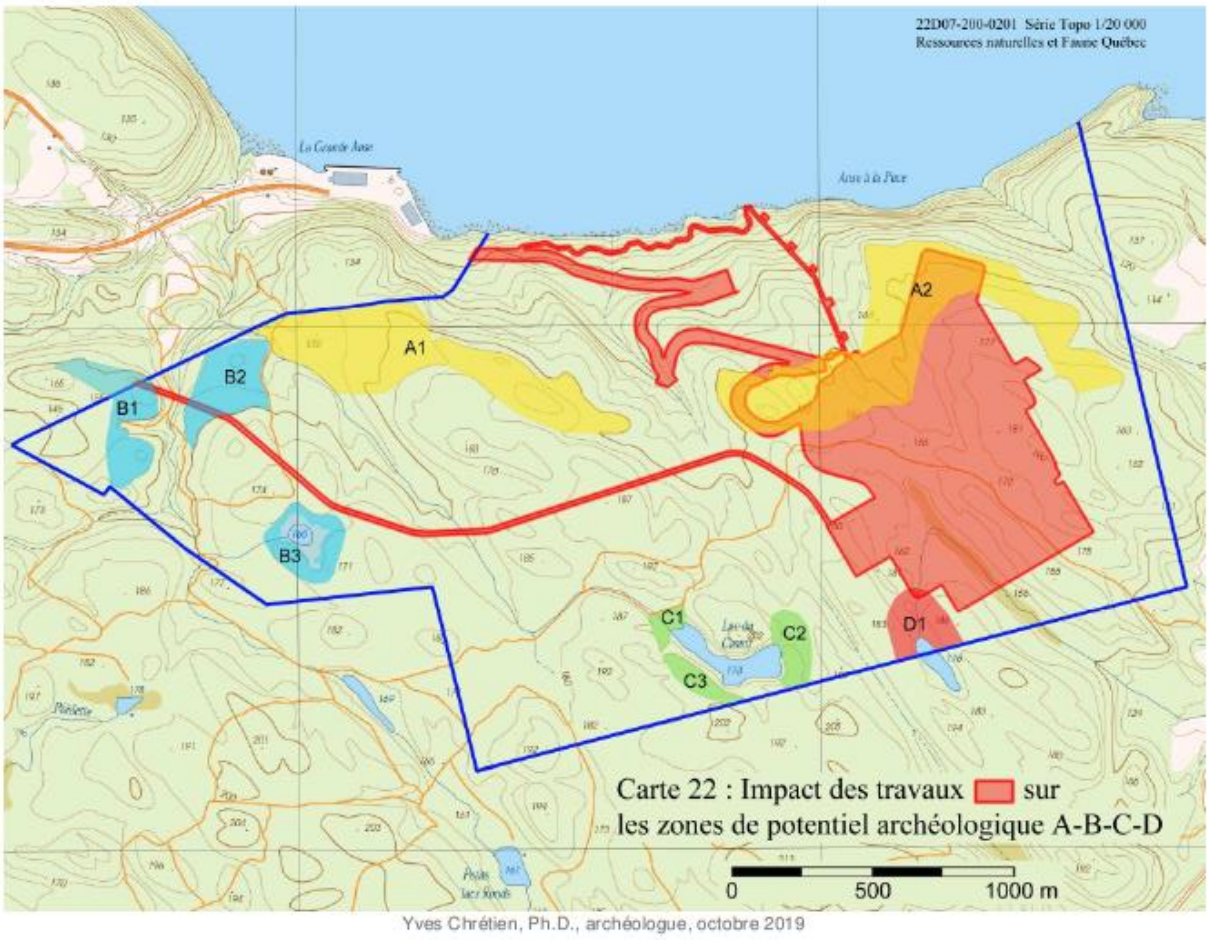
To assess the reference state of the visual environment in the study area, 19 landscape units were identified by the Proponent (see Figure 12; Sectoral report on the landscape, WSP and GCNN, November 2018). These units are classified into the following five landscape types:

- River landscapes;
- Urban landscapes;
- Industrial, utility and other infrastructure landscapes;
- Agricultural and agroforestry landscapes; and
- Forest landscapes.

The Project area also contains nine areas of archaeological potential, which are associated with temporary camps dating to the early days of the logging industry as well as vacationing spots, located near lakes, streams and paleoshorelines[76] (Figure 12; WSP, January 2019). The information provided in the impact statement does not mention the presence of areas of archaeological potential known to the Innu First Nations within the restrained study area. The Huron-Wendat Nation confirmed that it would identify, in conjunction with the Proponent, areas of archaeological potential that should be surveyed prior to the commencement of work. Since the territory of the Wolastoqiyik Wahsipekuk First Nation does not reach the Project area, no effects are expected on the archaeological heritage of this First Nation**.**

[76] The study of paleoshorelines makes it possible to reconstruct past variations in sea level – in this case, the level of the Saguenay River shoreline at different points in time.

Figure 12: Location of areas covered in the archaeological potential study



Source: WSP, July 2021

Potential Effects

Forest clearing, soil disturbance during construction in the terrestrial and marine environment, as well as the addition of structures associated with the Project (for example, the tops of tanks, flares and certain buildings, exposed rock faces, the cryogenic piping, marine infrastructure) would change the visual footprint on the plateau and the south shore of the Saguenay River. The presence of ships in the dock would also contribute to changes in the visual environment.

To visualize the potential effects of the Project on the landscape, mapping of areas of visibility (which illustrate the vantage points from which the largest facilities would be visible) and visual simulations using computer-generated images were carried out by the Proponent (WSP, January 2019 and January 2020). The simulations were run from three different vantage points, i.e., Cap Jaseux (Point 1 on Figure 15; see

also Figure 13), Anse-à-Pelletier (Point 2 on Figure 15; see also Figure 14) and Chemin Saint-Joseph (Point 3 on Figure 15).

The Project should be barely visible or not visible at all from the majority of the landscape units studied. For example, some locations on the surrounding agricultural plain would serve as vantage points but only from great distances. The same is true for the Saguenay – St. Lawrence Marine Park and the Saguenay Fjord National Park areas.

However, the Project is expected to be visible from shoreline properties, public places and tourist sites near the fjord, specifically along its northern arm (area R3, Figure 15). Residents of the Îles à Jalbert and Anse-à-Pelletier would be the nearest permanent observers, with open views over the fjord and the Project. The Project would also be visible from the Cap Jaseux area and the Parc Aventures Cap Jaseux, which is the potential receptor closest to the Project site. Changes to the landscape would be visible to the various users who visit this part of the fjord (for example, recreational boaters, cruise ship passengers, ferry passengers).

The main potential effect on archaeological resources is the risk of damage to or destruction of these resources during construction.

The potential effects of increased shipping on beluga whales are discussed in Section 5.2 of this report.

Figure 13: View of proposed infrastructure from Cap Jaseux (Point 1, Figure 15) before (top image – current situation) and after (bottom image – projected situation) the Project

Source: WSP, July 2021

Figure 14: View of proposed infrastructure from Anse-à-Pelletier (Point 2, Figure 15) before (top image – current situation) and after (bottom image – projected situation) the Project.

Source: WSP, July 2021

Mitigation and Follow-up Measures Planned by the Proponent

To mitigate the effects of the Project on physical and cultural heritage, the Proponent has undertaken to plan its choice of materials and colours to achieve visual harmony between the structures and the landscape. In particular, the Proponent plans to reduce levels of contrast between the buildings and components of the liquefaction complex and the surrounding environment by using matte finishes to prevent reflectance, white or light grey colours for structures over 10 metres tall and dark colours at ground level. No promotional material or advertising will be permitted on the largest facilities. Areas that will no longer be used (work areas, constructed slopes, stripped surfaces, abandoned routes and roads, etc.) will be promptly revegetated with a variety of native species. Thus, these plantings will, over time, help to partially mitigate the visual footprint of the facilities. Upon closure of the Project, the Project's terrestrial infrastructure will be dismantled and the areas will be revegetated. Marine infrastructure, on the other hand, will remain in place.

In terms of monitoring the Project's effects in terms of changes to the landscape, photographs will be taken every year during the first five years of the Project, and then once five years after completion of construction in order to compare the actual visual effects against those expected based on the visual simulations conducted. A survey will be conducted among permanent residents and users regarding their perceptions of the landscape changes, in order to validate the assessment of effects on the landscape and the effectiveness of the mitigation measures that were implemented.

As for the effects on the cultural heritage of the First Nations, the Proponent has also committed to setting up initiatives aimed at developing knowledge on the importance of the beluga whale on a social, cultural and even spiritual level for the Innu First Nations and on the modern transposition of this link. Among the initiatives that could be the object of a future collaboration on this subject, the co-financing of a doctoral project or the valorization of the importance of the beluga whale through interpretation initiatives (signs or others) were discussed. The development of a collaboration agreement with the Huron-Wendat Nation could also lead to this type of initiative.

With respect to archaeological resources, surveys will be conducted prior to the commencement of work in areas of archaeological potential – that is, areas A2, B1, B2 and D1 (Figure 15). Parks Canada specifies that a professional archaeologist, whose specialty is related to the potential of the mentioned sectors, should be hired to carry out these inventories. In addition, an archaeological permit should be requested by the archaeologist from the Government of Quebec's Ministère de la Culture et des Communications for any archaeological interventions on non-domain lands. The Proponent also plans to conduct archaeological monitoring as work is carried out in areas of archaeological potential. If an archaeological site is discovered, it would, to the extent possible, be bypassed and placed under protection. If the construction work poses a direct threat to the site and the situation cannot be changed, the Proponent would undertake a systematic excavation to recover all cultural elements before authorizing the resumption of construction work. Any chance finds outside of areas of archaeological potential must be reported immediately. Measures to be taken for archaeological resources on non-federal lands will be developed in compliance with the requirements of the ministère de la Culture et des Communications du Québec. It should be noted, however, that on federal lands, chance finds and archaeological work must be referred to the federal authorities responsible for these lands. Since a portion of the Project will be located on federal land, a fortuitous archaeological find during work on this part of the Project must be reported to the Saguenay Port Authority. The planning of any project to conserve an archaeological discovery on federal land must also take into

consideration the *Standards and guidelines for the conservation of historic places in Canada* and the *Preventive conservation guidelines for collections*.

Discussions were held between the Proponent and the Innu First Nations on the management of archaeological resources. Discussions with the Huron-Wendat Nation are expected to continue. The Proponent mentioned that the First Nations would have the opportunity to participate in the archaeological monitoring, regardless of whether a find is located in an identified area of archaeological potential or in an area not identified as such. They will thus be involved from the start of the Project and will be able to participate in the targeted inventories. The Proponent, in collaboration with the Innu First Nations, will also develop measures designed to commemorate and celebrate their cultural heritage, particularly by using Innu place names on the site of the future plant or on a site considered relevant based on the results of the archaeological inventories.

As mentioned by Parks Canada in its notice of June 11, 2021, the practice of archaeology in Quebec is carried out by professionals whose specialty concerns the occupation of the territory by Aboriginal peoples for some, or that of the Euro-Canadians for others. Archaeological interventions should take into account these specializations so that the data received can be analyzed in an optimal way. Furthermore, discoveries related to the archaeological heritage of Aboriginal peoples must be brought to their attention so that they can provide their opinions. Thus, Parks Canada recommends that the Proponent continue the approaches made to Aboriginal peoples at each stage of the archaeological project.

With regard to environmental monitoring, the Proponent indicates that any incidental archaeological discovery will be duly evaluated and examined by a professional archaeologist. According to Parks Canada experts, the best way to ensure the identification of an archaeological find in the field is to have an archaeologist on site at all times during excavation work, both in areas with archaeological potential and in those considered to have no archaeological potential.

5.8.2 Agency Analysis and Conclusions on Residual Effects

The Agency is of the opinion that the Project would cause significant adverse environmental effects on the cultural heritage of the Innu First Nations, given the disturbance of marine mammals that would be caused by the tankers, even following the implementation of mitigation, monitoring and follow-up measures.

Analysis of the Effects

The Agency notes that the Project site is to be used for the construction of port and industrial facilities. At the same time, the area is characterized by existing infrastructure, such as the Grande-Anse marine terminal. However, the eastern part of the site remains largely undeveloped.

The quality of the Saguenay Fjord landscapes is highly valued by the Innu First Nations of the Essipiunnuat, the Pekuakamiulnuatsh and the Pessamiulnutsh, the Huron-Wendat Nation, the Saguenay-St. Lawrence Marine Park and the local population. The same holds true for the Ville de Saguenay and the regional county municipality of Fjord-du-Saguenay, which have identified the fjord as an area of aesthetic importance. The visual influence of the infrastructure on the area of the Saguenay-St. Lawrence Marine Park will be low overall, since there are not many sightlines possible from the majority of the surrounding vantage points.

However, despite the measures proposed by the Proponent in order to reduce the project-related effects on the landscape, these measures do not fully mitigate the visual effects on observers in the landscape unit of the northern arm of the fjord (R3), specifically for users of the Parc Aventures Cap Jaseux area, residents of the Îles à Jalbert and Anse-à-Pelletier as well as users navigating the fjord within the Project area.

With regard to archaeological resources, the construction work could result in the accidental breakage of objects, displacement of artifacts and exposure of archaeological resources related to First Nations or a Euro-Canadian presence. Additionally, construction activities could involve the addition of fill material that may restrict access to archaeological remains. The risk of this occurrence will be minimized by conducting inventories in the areas of archaeological potential affected by the work and by implementing the mitigation measures proposed by the Proponent.

Furthermore, the beluga whale is part of the cultural heritage of the Innu First Nations of the Essipiunnuat, the Pekuakamiulnuatsh and the Pessamiulnutsh. In this sense, the potential effects of the Project on this species, as described in section 5.2 of this report, are a major source of concern for the Innu First Nations. The eventual disappearance of this species would cause the disappearance of part of the distinctive culture of these First Nations. The beluga whale is also a species of importance to the Wolastoqiyik Wahsipekuk First Nation.

Conclusion

The Agency concludes that the level of the effect on archaeological resources and landscape modification on the heritage will be moderate:

- The magnitude of the Project's effects will be medium because :
  - The effects would result in the loss or alteration of certain characteristics of the unique nature of the landscape, but would not compromise the integrity of physical and cultural heritage in the landscape units assessed;
  - Access to or use of an element of archaeological importance would not be compromised for users;
- The effects would not adversely affect the maintenance or management of designated heritage elements. The Project would entail a local and long-term change;
- This change would be irreversible and continuous over time.

However, the Agency concludes that the level of effect on the cultural heritage of the Innu First Nations would be significant:

- The magnitude of the effects of the Project would be moderate since:
  - The effects would result in the loss or modification of certain characteristics specific to the particular character of an element of the First Nations' cultural heritage, but would not compromise the integrity of the First Nations' cultural heritage;
- The Project would result in a regional modification in the Saguenay River and the St. Lawrence Estuary in the long term;
- This modification would be partially reversible since the First Nations' cultural heritage could partially recover from the effects caused by the Project, but without returning to their baseline value;

- The effects on First Nations cultural heritage would occur continuously throughout the Project operation phase.

Determination of Key Mitigation Measures

The Agency has identified key measures that would help reduce effects on cultural and natural heritage. However, these measures would not mitigate the residual effects sufficiently to render them insignificant. In determining the key mitigation measures, the Agency considered the mitigation measures proposed by the Proponent, the advice of government authorities, as well as comments received from consulted First Nations and the public:

- Choose materials and colours that harmonize with the natural environment of the areas adjacent to the Project and use matte finish paint with low levels of reflectance;
- Revegetate, in a uniform manner, disused access roads, work areas, constructed slopes and stripped surfaces as the construction work is completed so as to achieve a composition and abundance of vegetation comparable to that found in the areas adjacent to the Project. To do so, use native deciduous and coniferous species that are adapted to the surrounding environment;
- Prior to any archaeological intervention on federal lands, initiate discussions with the Administration portuaire du Saguenay and the Innu First Nations of the Essipiunnuat, the Pekuakamiulnuatsh and the Pessamiulnutsh, and the Huron-Wendat Nation regarding the long-term conservation of archaeological data produced and artifacts that may be discovered during fieldwork. The deposit and conservation of data and artifacts resulting from archaeological work on the lands of other jurisdictions is the responsibility of the Ministère de la Culture et des Communications du Quebec;
- Have a qualified archaeologist conduct an archaeological inventory in areas of archaeological potential A2, B1, B2 and D1, in consultation with the appropriate authorities and the Innu First Nations of the Essipiunnuat, the Pekuakamiulnuatsh and the Pessamiulnutsh, and the Huron-Wendat Nation. In doing so, the Proponent must:
    - Consult, prior to the commencement of the inventory, with each of the First Nations on their interests and opportunities for participation in the conduct of the inventory, including the conduct of the field inventory and the evaluation of the inventory results;
    - Complete the report on the results of the inventory consultation with the First Nations and submit the final report to the Agency and the First Nations within 30 days of its completion;
- If any structure, site or thing that is of historical, archaeological, paleontological or architectural significance is discovered by the archaeologist during the archaeological inventory or is reported to the Proponent by the Innu First Nations of the Essipiunnuat, the Pekuakamiulnuatsh and the Pessamiulnutsh, the Huron-Wendat Nation, the Proponent must:
    - Notify the Agency and the First Nations, the manager of the federal land or the Ministère de la Culture et des Communications du Quebec within 24 hours of the discovery and allow the First Nations to monitor the archaeological work;
    - To comply with all applicable legislative or legal requirements and related regulations and protocols respecting the recording, protection, transfer and safeguarding of structures, sites or things of

historical, archaeological, paleontological or architectural significance, including regulations and protocols applicable to structures, sites or things of historical, archaeological, paleontological or architectural significance found on federal lands;

- If a historically, archaeologically, paleontologically or architecturally significant structure, site or thing is discovered by the archaeologist or reported to the archaeologist by the Essipiunnuat Innu First Nations, the Pekuakamiulnuatsh, the Pessamiulnutsh, the Huron-Wendat Nation or other parties during construction or archaeological monitoring of the work, the Proponent shall:
  - Immediately stop the work on the site of the discovery;
  - Delineate an area of at least 30 metres radius around the discovery in which work is prohibited. The work ban does not apply to actions necessary to protect the integrity of the discovery;
  - Assign a qualified person, who is a professional archaeologist, the responsibility to conduct an assessment at the site of the discovery and to implement mitigation measures to ensure the protection and safeguarding of the discovery;
  - Notify the Agency, the First Nations, the manager of the Commissioner's Land or the Ministère de la Culture et des Communications du Québec within 24 hours of the discovery and allow for First Nations monitoring of the archaeological work;
- Comply with all applicable legislative or legal requirements and related regulations and protocols regarding the recording, protection, transfer and safeguarding of structures, sites or things of historical, archaeological, paleontological or architectural significance, including regulations and protocols applicable to structures, sites or things of historical, archaeological, paleontological or architectural significance found on Crown land;
- Include archaeological monitoring by a full-time professional archaeologist in the field during any excavation on the land portion of the Project on federal lands;
- Provide for the services of a qualified third party professional archaeologist to independently observe and record the implementation of any archaeological interventions carried out by the proponent as part of the Project;
- Discuss with the Innu First Nations the implementation of initiatives related to the development of knowledge on the social and cultural importance of the beluga whale to their First Nations.

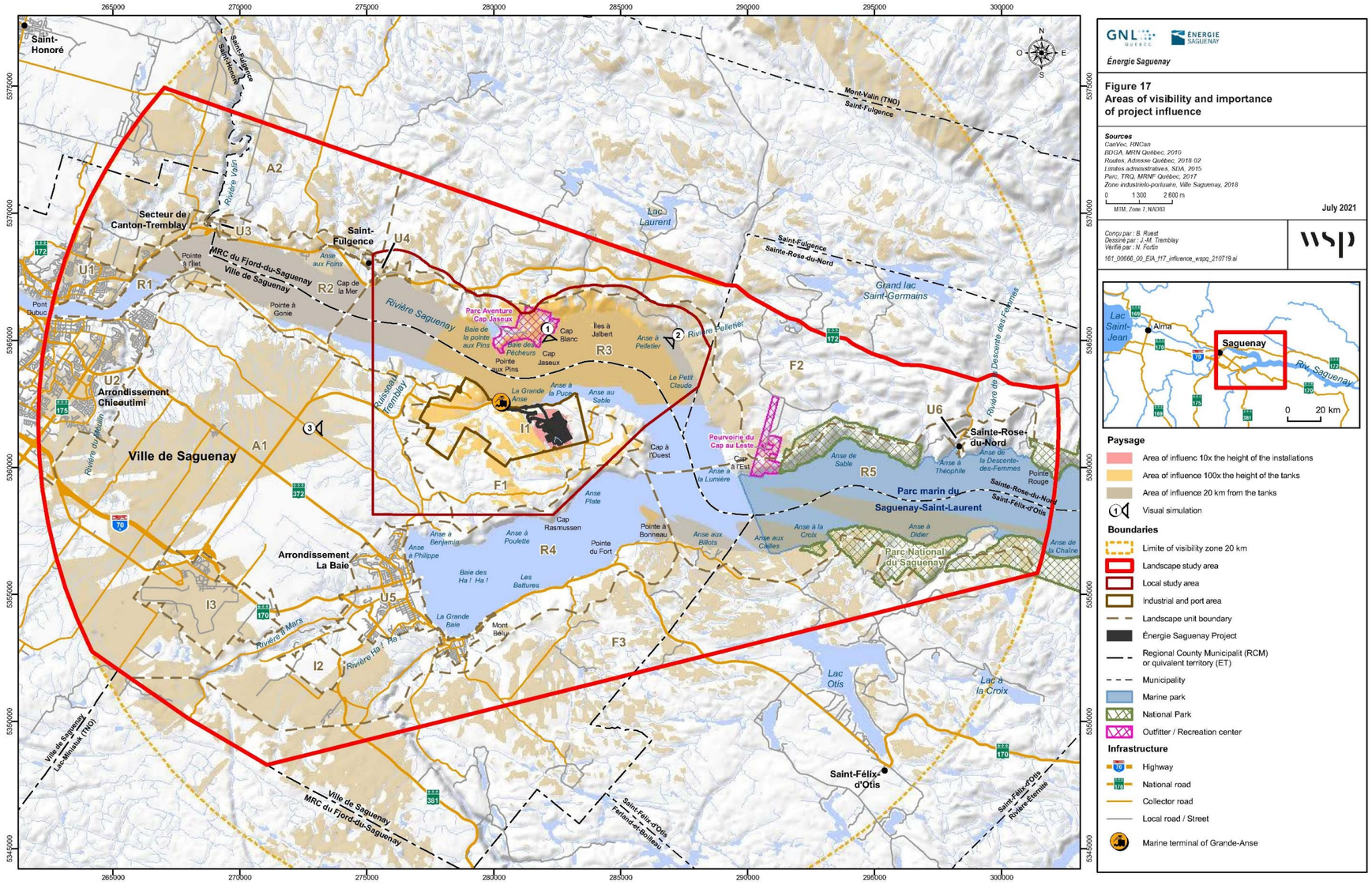
Need for Follow-up and Follow-up Requirements

Concerns were raised regarding the effectiveness of the mitigation measures designed to harmonize structures with the visual environment of the Saguenay Fjord. To verify the predicted 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, in consultation with the Innu First Nations of the Essipiunnuat, the Pekuakamiulnuatsh, the Pessamiulnutsh, as well as the Huron-Wendat Nation, the competent authorities and potentially affected parties, and implement a follow-up program in order to validate the assessment of the effect of the Project on the visual environment. The follow-up will have to be carried out during the construction phase and the operation phase of the Project. In doing so, the Proponent shall:

- Monitor, at least annually during operation, the integrity of the subject pavement, including paint;
- Monitor the environmental effects of the Project on the visual environment using photographs taken from viewpoints comparable to those used for the visual simulations conducted as part of the environmental assessment. The Proponent shall take photographs annually during construction and every two years for the first 10 years after construction is completed and every five years thereafter, up to 25 years after construction is completed;
- Assess, by the end of the fifth year following completion of construction and using recognized survey methods, the impacts experienced by potentially affected parties of changes to the visual environment caused by the Project;
- Monitor, at least annually at the end of the plant growing season, the growth, composition, and abundance of vegetation for the operational phase;
- Develop and implement modified or additional mitigation measures if the results of the monitoring program demonstrate that modified or additional mitigation measures are required to mitigate the adverse environmental effects of the Project on the visual environment.

Figure 15: Landscape units, visibility areas and vantage points used in the visual simulations



GNL QUÉBEC | ÉNERGIE SAGUENAY

Énergie Saguenay

Figure 17
Areas of visibility and importance of project influence

Sources
CanVec, RNCan
BDGA, MRN Québec, 2010
Routes, Adresse Québec, 2018 03
Limites administratives, SDA, 2015
Parc, TRQ, MRNF Québec, 2017
Zone industrielo-portuaire, Ville Saguenay, 2018

0 1 300 2 600 m
MTM, Zone 7, NAD83

July 2021

Conçu par : B. Ruest
Dessiné par : J.-M. Tremblay
Vérifié par : N. Fortin
161_00666_00_EIA_f17_influence_wspq_210719.ai

wsp

Paysage
- Area of influenc 10x the height of the installations
- Area of influence 100x the height of the tanks
- Area of influence 20 km from the tanks
- Visual simulation

Boundaries
- Limite of visibility zone 20 km
- Landscape study area
- Local study area
- Industrial and port area
- Landscape unit boundary
- Énergie Saguenay Project
- Regional County Municipalit (RCM) or quivalent territory (ET)
- Municipality
- Marine park
- National Park
- Outfitter / Recreation center

Infrastructure
- Highway
- National road
- Collector road
- Local road / Street
- Marine terminal of Grande-Anse

Source: WSP, July 2021

5.9 Socioeconomic Conditions

The Project could cause residual effects on the socioeconomic conditions related to recreational and tourist activities of marine mammal watching in the Saguenay-St. Lawrence Marine Park. However, the Agency is of the opinion that these effects are not likely to be significant given the implementation of the mitigation and follow-up measures recommended in the section 5.9.2.

In determining the significance of effects on socioeconomic conditions, the Agency assesses, among other things, whether the effects of the Project on the environment would result in changes to recreational tourism and commercial fishing activities in areas of regular use within the Project's areas of influence. The following subsections specify the information considered in the analysis.

5.9.1 Analysis of Potential Effects and Proposed Mitigation Measures

The Agency analyzes the repercussions of the changes that are likely to be caused to the environment on the socioeconomic conditions of local and regional communities and First Nations. This chapter addresses the effects of the Project, including associated navigation, on socioeconomic conditions related to recreational tourism and commercial fishing activities that take place on the Saguenay River between the Dubuc Bridge in the city of Saguenay and its mouth with the St. Lawrence River, as well as in the St. Lawrence Estuary to Les Escoumins. First Nations traditional use of lands and occupancy is discussed in section 5.7 of this report.

Description of the Component

In the Project area, jobs associated with the tertiary sector of the economy, which includes recreation and tourism activities, account for nearly 80% of all jobs (WSP and GCNN, April 2018). According to Tourisme Saguenay-Lac-Saint-Jean, 1.5 million tourists visit the region annually. The Saguenay Fjord area and the city of Saguenay alone attract some 720,000 visitors annually, in addition to the 93,142 tourists added by international cruise activity. According to estimates presented by Tourisme Saguenay-Lac-Saint-Jean, in 2015, tourists spent $295 million in the region, for an economic impact of $252 million, contributing to the retention of 3,694 jobs.

Like the river estuary, the fjord's natural landscapes are highly valued attractions for tourists seeking a special nature experience. More than half of the tourist clientele responded that they visited the region "for the scenic appeal, and several businesses located around the fjord are among the most valued experiences for visitors" (TSLSJ, June 2019). Thus, in addition to being a site of cultural and physical heritage interest for regional communities and First Nations, the fjord and fluvial estuary also constitute an important source of revenue for a regional economy closely linked to the assets of the natural landscape, biodiversity and the nature experience sought by tourists (the effects of the Project on physical and cultural heritage are discussed in section 5.8 of this report).

Recreational tourism activities in and around the Project area include boating (for example, sea kayaking, kitesurfing or paddleboarding), beaches and swimming. The main recreational and ecotourism attractions and centres in the region are the Saguenay-St. Lawrence Marine Park, the Fjord-du-Saguenay–National Park, the Parc Aventures Cap Jaseux, the Pourvoirie du Cap au Leste (outfitter), the Centre d'interprétation des battures et de réhabilitation des oiseaux in Saint-Fulgence, as well as the Saguenay Fjord bicycle path.

Located less than 10 kilometres downstream from the Project site, the Saguenay-St. Lawrence Marine Park is the only protected marine environment in Quebec. The park receives more than one million visitors annually, including 460,000 for the marine circuit. The park is an important economic engine for the region, due to the diversity of recreational and tourist activities that take place there. Among these activities, the observation of marine mammals, such as beluga whales, rorquals and seals, makes the park famous and constitutes a powerful tourist asset. Whale watching from boats or from land-based sites is by far the most popular activity in the Saguenay-St. Lawrence Marine Park, with nearly 80% of park visitors confirming that they had done so in 2010 (WSP, January 2019, p. 810).

About twenty marinas, wharves and other launching sites giving access to the park exist between the city of Saguenay and Tadoussac. In addition, there are a dozen businesses offering nautical excursion packages (sea kayaks, boats, zodiacs) on this territory, either for the observation of marine mammals or for the discovery of the regional heritage and landscape, or for diving and sailing. Excursions are heavily concentrated in the area of the mouth of the Saguenay River, between Tadoussac and Les Bergeronnes and, to a lesser extent, in the Baie-Éternité area.

According to a portrait of navigation in the Saguenay-St. Lawrence Marine Park in 2017, 6,658 excursions were carried out by boat holding permits for marine mammal observation activities, for a total of 287,180 passengers. In addition, 659 trips were conducted by Class 2 licence holders (other commercial marine activities) and 4,206 passengers took part in these trips. Finally, 2,024 trips were conducted by Class 3 permit holders (human-powered activities) and 16,167 passengers took part in these trips.

With regard to commercial navigation, the Saguenay River is frequented by merchant ships, ferries, marine operations boats, commercial fishing boats, as well as national and international cruises. Crab boats also travel between Anse aux Basques and the south shore plateau (Turgeon, 2019). In 2017, there were 91 commercial fishing days in the marine park, 87 of which were attributable to sea urchin fishing and four to Atlantic halibut.

As for sport fishing, the Proponent has identified 8 fishing sites in the Project sector and its immediate vicinity, in the communities of Chicoutimi, La Baie, Saint-Fulgence and Sainte-Rose-du-Nord. Rainbow smelt, brook trout and walleye are among the species prized by sport fishers. Other species of interest for recreational fishing activities in the area are Atlantic sturgeon, Greenland shark, American eel and Atlantic redfish. Summer sports fishing is an increasingly popular activity in the Saguenay River. However, it is winter recreational fishing, or ice fishing, that has the greatest number of enthusiasts in the region. Practised from January to March in the Saguenay River, ice fishing generates more than $5 million in revenue through the direct expenditures of approximately 5,000 anglers each winter (WSP and GCNN, April 2018). The Borough of La Baie and the municipalities of L'Anse Saint-Jean, Saint-Félix d'Otis, Rivière-Éternité, Sainte-Rose-du-Nord, and Saint-Fulgence are the main ice fishing locations near the Project.

Indigenous Businesses

Essipiunnuat First Nation businesses are primarily in the fisheries and recreotourism sectors. There are six outfitters, including one located along the coast near Tadoussac, as well as marine mammal watching, sea kayaking, and accommodation and camping businesses on the coast (Transfert environnement et société, April 2018). "Entreprises Essipit" is the economic arm of the Essipiunnuat First Nation Council. In 2015, these businesses generated 87 jobs for Indigenous people and 309 jobs for non-Indigenous people.

Commercial fishing is also an important activity for the Essipiunnuat First Nation. The community has two boats, one of which is co-owned with the Innu community of Pessamiulnutsh. Snow crab and green sea urchin are the main species fished under the Aboriginal Fisheries Strategy -AFS (Transfert environnement et société, April 2018). The commercial green sea urchin fishery is a recent but important activity for the Innu of Essipit and Pessamit. In Quebec, more than two-thirds of the catches of this species come from this commercial fishery. The UMEK group, formed from the partnership between the band councils of Essipit, Pessamit and Uashat mak Mani-utenam and the group Les Crabiers du Nord[77], operates a snow crab processing plant. The Essipit fishing and processing industry employs nearly 200 people (AMIK, consulted on May 12, 2021). In the same vein, the commercial fishery practised by the Pessamiulnutsh First Nation is mainly oriented towards snow crab, sea urchin, Arctic surf clams and Greenland halibut.

The Wolastoqiyik Wahsipekuk First Nation conducts commercial fishing activities in the St. Lawrence Estuary, including northern shrimp, snow crab, lobster, groundfish, sea cucumber and sea urchin (AGHAMM, accessed May 12, 2021). The Wolastoqiyik Wahsipekuk First Nation also harvests green sea urchin between the southern shores of Île aux lièvres and Île Blanche in the St. Lawrence Estuary. In August 2019, this First Nation signed the "Renewable Fisheries Resources Agreement" with Fisheries and Oceans Canada, the Canadian Coast Guard and Crown-Indigenous Relations. The agreement aims, among other things, to improve the socioeconomic conditions of the community through the acquisition of more fishing licences and quotas, as well as fishing vessels and gear. The Wolastoqiyik Wahsipekuk First Nation is also undertaking other projects in the processing and full value-added of green sea urchins. First Nations commercial fisheries activities also have a traditional component as they include mechanisms for community distribution.

Potential Effects

Potential Effects Related to Landscape Changes

Recreational and tourist activities in the sector could be affected by the changes the Project would bring to the existing landscape of the site. According to the Proponent, the presence of the liquefaction terminal and the increased presence of tankers will change the visual environment of this portion of the fjord and its aesthetic quality. These elements will be visible from waterfront properties, public places and waterfront tourist sites offering direct visual access to the site of the liquefaction complex and its marine infrastructure, as well as from the water, pleasure boats and marine shuttles that navigate the fjord (WSP, January 2019).

[77] Les Crabiers du Nord" is an "association between Pêcheries Manicouagan (a company active in the field of seafood processing) and a group of six crab fishing companies" [Online].

Changes to the landscape are recurrent concerns raised by the public. In several comments and briefs submitted to the Agency, groups of tourism businesses in the region expressed concern about the loss of the wild and intimate character of the fjord, the incompatibility between the Project's infrastructure and the natural landscapes, the effects of the changes to the light and sound environment, and the noise resulting from the Project. According to the public, these effects could affect the long-term development, and even the continuity, of several recreational and tourism businesses that depend on the attractions of the region's landscapes.

For example, the Collectif de l'Anse-à-Pelletier is concerned about the socioeconomic impact that the Project could have on the commercial activities of Parc Aventures Cap Jaseux. The natural stay lodging service in transparent domes and suspended spheres could lose its appeal due to changes in the nighttime lighting ambiance from the Project's infrastructure (Collectif de l'Anse-à-Pelletier, June 2019).

Potential Effects Related to Increased Vessel Traffic

The Project would add between 150 and 200 vessels (between 300 and 400 passages) annually to the commercial traffic on the Saguenay River. The addition of approximately one passage per day to the current 450 (WSP, January 2019) could interfere with marine mammal watching, recreational tourism, including sport fishing, and commercial fishing activities.

Potential effects on marine mammal sightings

As described in section 5.2 of this report, the increase in marine traffic on the Saguenay River and the St. Lawrence Estuary could hinder the recovery of the beluga whale and thus contribute to a decline in the number of individuals frequenting these environments. Beyond the concerns about the ecology of the species, the impact of this decline could be felt in the tourism industry, given that this is an emblematic species that contributes to the international reputation of the Saguenay Fjord (TSLSJ, June 2019). Similarly, for the Essipiunnuat Innu First Nation, the increase in marine transportation is a major concern because of the risk of a decrease in the number of marine mammals and its consequences on Innu businesses dedicated to their observation.

Potential effects on cohabitation with other users

The increase in marine traffic on the Saguenay River and St. Lawrence Estuary could also have effects on the safety of recreational and socioeconomic activities on the water. The effects could result from more frequent encounters between the Project's tankers and the boats of recreational tourism enterprises (for example, kayak tours, mammal-watching cruises), pleasure boating, cruising in general, and the ferry-linking Baie-Sainte-Catherine and Tadoussac. In addition, there would be an increase in encounters between the merchant ships currently circulating in the Saguenay River and the tankers. On this subject, the Proponent points out that the Saguenay–St. Lawrence Marine Park Master Plan indicates that the intensity and the increase in maritime traffic in the St. Lawrence Estuary, particularly in the mouth of the Saguenay River, constitute important issues in terms of public safety, the environment and conflicts of use.

In this regard, Parks Canada is concerned about the effect of tanker operations on the experience and safety of visitors to the Saguenay-St. Lawrence Marine Park, given the current relative quietness of the Saguenay Fjord and this unique site for recreational tourism activities.

The public expressed concern about the safety risks to smaller vessels, particularly due to the height of the waves generated by the passage of tankers. In particular, they are concerned that these waves could destabilize pleasure craft and those used for recreational fishing. With regard to recreational fishing, the Fjord Coalition is also concerned about the effect of the waves generated by the tankers on the movement of the ice and, in particular, the effects that they could have on ice fishing. On this point, the Proponent mentions that the waves formed in the wake of the tankers can destabilize small boats (kayak, canoe, rowboat, sailboat, windsurfer, etc.) and also break up the ice on the shores where ice fishing is practised (WSP, January 2020, p. 306).

Potential effects on commercial fisheries

The increase in marine traffic on the Saguenay River and the St. Lawrence Estuary could have negative effects on commercial fishing activities (green sea urchin, snow crab and Greenland halibut) that take place in the area of the mouth of the Saguenay River and the St. Lawrence Estuary. These consequences could result from the increased risk of accidental oil or hazardous material spills during the construction and operation phase, as described in section 6.1 of this report.

The Essipiunnuat and the Pessamiulnutsh are concerned about accidents that could occur in the shipping lanes used by the Project's vessels. According to these First Nations, the quality, productivity, accessibility and safety of their commercial fishing activities (as well as those of the above-mentioned recreational tourism activities) could be irreparably affected in the event of an accident involving the Project's tankers. They believe that even a temporary effect on these activities would have major consequences on their capacities and way of life. In the case of the Essipiunnuat, negative economic effects on their businesses could translate into negative effects on their community system, which is based on a community development philosophy, focused on creating jobs in areas that maintain and evolve traditional values[78].

The Wolastoqiyik Wahsipekuk First Nation has expressed concern about the potential effects of the Project on the operation of its commercial fisheries and its development projects. Beyond the risk associated with the simple increase in marine traffic and the potential for collisions, spills and contamination of directly harvested stocks, the Wolastoqiyik Wahsipekuk First Nation is concerned about the potential for alteration of the first links in the food chain to affect the overall fisheries resource.

[78] Council of the Innu Essipit First Nation (innu-essipit.com). According to the website of the Council of this First Nation, their community development model is based on the affirmation of culture and traditional activities, the recognition and defence of ancestral rights, the recognition and defence of physical heritage and the environment, the use of natural resources in a context of sustainable development and other principles related to the link between their community and the Earth.

Cumulative Effects[79]

Cumulative Effects Related to Landscape Changes

For the analysis of the cumulative effects on this component, the Proponent carried out a study on the landscape, within a radius of 20 kilometres from the Project site. It took into account the concerns of local and regional communities about the loss of quality of the landscapes of the Saguenay Fjord, in relation to tourist sites and camping and navigation activities. The Project would take place in an area where the aesthetic and recreational assets of the fjord are combined with industrial infrastructure, such as the Grande-Anse port, which has been in operation since 1984, and the Rio Tinto facilities at the bottom of Baie des Ha! Ha! built in 1915[80]. Two other industrial-port infrastructure would be added in the vicinity of the Project, namely the Métaux BlackRock processing plant and the Marine Terminal on the north shore. The Proponent anticipates non-significant effects for most of the landscape units studied. Nevertheless, the Proponent recognizes that observers located in the Parc Aventures du Cap Jaseux sector and recreational and tourist users frequenting the North Arm of the fjord (see section 5.8.1 of this report) could be disturbed by the changes to the landscape, particularly because of its aesthetic and recreational interest and the high value attributed to it by sensitive receptors.

Cumulative Effects of Increased Vessel Traffic on Recreation and Tourism Uses

The Proponent points out that the effects of navigation related to the Project could combine with those of navigation from other existing and planned projects in the region and could triple commercial navigation on the Saguenay River. This rise would increase safety risks and complicate cohabitation between commercial vessels and smaller craft. Similarly, recreational tourism activities in the Saguenay Fjord sector and the St. Lawrence Estuary could be affected by the cumulative effects of the increase in marine traffic. For more information on the description of the scope of the assessment of cumulative effects associated with navigation on marine mammals, including the St. Lawrence beluga whale, see section 5.2.

However, the Proponent is of the opinion that the potential effects of this increase in maritime traffic on recreational and tourist activities would generally not be significant. It considers that the Saguenay River is a relatively wide and deep waterway that is not very frequented by commercial ships. With an average of 1.8 vessels per day expected in 2030, commercial navigation would remain low, according to this perspective. For the St. Lawrence Estuary and the mouth of the Saguenay River, this increase would also be small when compared to the 69,000 vessel movements that occur annually.

Mitigation and Follow-up Measures Planned by the Proponent

The mitigation and follow-up measures concerning landscape modifications (see section 5.8.2 of this report) would reduce the effects of the Project on recreational and tourism activities and socioeconomic activities related to the aesthetic qualities and natural assets of the sector's landscapes. The mitigation and follow-up

[79] Subsection 5.7.1 of the Current Use of Lands Chapter provides a brief characterization of other projects and activities whose effects would be additive to the effects of the Project.
[80] Named Alcan at the time.

measures for the effects on marine mammals, including beluga whales (see section 5.2.2) would reduce the effects of the Project on recreational and socioeconomic activities related to marine mammal watching.

Similarly, the Proponent mentions other information that would make it possible to mitigate the effects of the increase in marine traffic on cohabitation with other users of the Saguenay River and the St. Lawrence Estuary. In order to ensure safe cohabitation, tanker manoeuvres will be governed by the practices and procedures of the Saguenay Port Authority in its area of jurisdiction. Downstream of this zone, tankers will have to travel at a maximum speed of 10 knots between the Les Escoumins station and the liquefaction complex. The Proponent is also of the opinion that the knowledge and respect, by pleasure boaters and commercial navigation, of the regulations governing their navigation activities would serve to prevent collisions and situations that could endanger their safety.

As for the effects of waves created by tanker on the safety of small boats and ice fishing activities in the Saguenay River, the Proponent believes that they would not be more significant than those of current marine traffic. According to the Proponent, the aerodynamic design of the tankers and the reduction of the maximum speed to 10 knots would mitigate the effect of waves. The Proponent is committed to working with stakeholders interested in marine transportation through an advisory committee on shipping issues.

The Proponent confirms that, if effects were more significant than reported in its impact statement, or if unidentified effects were reported, it would consider changing some operational practices, such as adjusting the timing of runs (for example, day or night), if possible (WSP, April 2021, p. 28).

The mitigation and follow-up measures for effects or failures (see section 6.1.2) would make it possible to avoid the effects of the Project on commercial fishing activities that take place in the St. Lawrence Estuary and at the mouth of the Saguenay River. Among other measures, the Proponent would inform the population of the risks of accidents and of the regulations governing navigation and the transport of hydrocarbons, as well as of the environmental and social consequences of a spill and the emergency measures to be adopted to limit its effects (WSP, January 2019).

Finally, the Proponent plans to develop a communication plan aimed at local and regional communities to inform them of the progress of the construction work and the means to protect the environment, as well as to set up an exchange and consultation office or a good neighbour committee and a system for handling complaints and comments.

5.9.2 Agency Analysis and Conclusions on Residual Effects

The Agency believes that, with the implementation of the key mitigation measures indicated below, the Project is not likely to cause significant adverse environmental effects on socioeconomic conditions related to recreational tourism activities or recreational and commercial fisheries. However, the Agency remains concerned about the potential cumulative effects of the increase in merchant vessels on marine mammals and socioeconomic conditions related to recreational tourism.

Analysis of the Effects

Potential Effects Related to Landscape Changes

Despite the scarcity of visual openings available towards the Project site from most of the surrounding points, residual visual effects would nevertheless exist for observers and users of the Parc Aventure du Cap Jaseux sector, residents of the Jalbert and Anse-à-Pelletier islands and for users navigating the Saguenay River in the Project sector. The proposed infrastructure could be perceptible from these three observation points, which could disturb certain users located in these areas.

The Agency notes that the sector targeted by the Project is already characterized by the Port of Saguenay's industrial infrastructure. Furthermore, the landscape of the sector could partially and progressively recover with the implementation of the mitigation measures planned by the Proponent, including the growth of vegetation around the liquefaction terminal. This recovery could reduce the disturbance for observers located at the above-mentioned points.

The Agency is of the opinion that the effects of the Project would cause little change in the activities of businesses that rely on the aesthetic assets of the fjord's landscapes. These changes would not compromise the continuity of their activities in the sector. The Agency also considers that the mitigation measures for landscape modifications (section 5.8.2 of this report) would reduce the effects on this component.

Effects of Increased Vessel Traffic

Effects on marine mammal watching activities

The beluga whale is a species that is highly valued, both in ecosystemic and socioeconomic terms, by the public and the First Nations consulted. The Agency considers that the significant adverse environmental effects of the Project on this species could alter the balance of biodiversity in the area. Such an alteration would diminish the attractiveness and the natural assets valued by the tourist clientele who choose the St. Lawrence Estuary and the Saguenay Fjord as their destination. A decrease in the number of tourists could generate direct negative economic effects due to the loss of income and jobs in the mammal-watching tourist industry. Indirect negative economic effects could also be felt by businesses in other related sectors, such as accommodation, restaurants and retail. Finally, induced negative economic effects could also affect regional communities with a consequent decrease in personal income.

These same negative effects could affect the Innu First Nations of Essipiunnuat and Pessamiulnutsh due to a decrease in their business revenues. Furthermore, the Agency believes that these potential negative effects would disproportionately affect the Innu First Nation of the Essipiunnuat, given the assets and businesses held by this community in the recreational tourism sector. For the same reasons, these economic effects could adversely affect the Essipiunnuat development system mentioned above.

However, there is still uncertainty about the extent to which the Project's negative effects on beluga, blue and fin whales and on the valued natural landscapes of the Saguenay River could affect the tourism industry. In this regard, the Agency notes the absence of data on the magnitude of potential economic losses that could result from the levels of underwater noise added by the Project's vessels or from the increased risks of whale mortality associated with the same vessels or the loss of attractiveness of the region caused by the

passage of many tankers. To mitigate this uncertainty, the Agency considers it important to set up a follow-up program on the effects of the Project and the effectiveness of the mitigation measures on socioeconomic activities related to recreotourism.

The Agency believes that the significant adverse environmental effects of the Project on the beluga whale would not immediately or completely compromise the continuity of recreotourism activities. It would be possible for visitors to continue to observe marine mammals in the Saguenay-St. Lawrence Marine Park from boats or land sites. However, the Agency remains concerned about the potential cumulative effects on marine mammals and the recreational tourism experience valued by visitors to the region and the Saguenay-St. Lawrence Marine Park. These effects could affect the long-term socioeconomic conditions of regional recreation and tourism businesses and associated activities (accommodation, food services, retail; see subsection on cumulative effects later in this section).

Effects on cohabitation with other users

The increase in shipping associated with the Project could also increase conflicts of use between marine park users. Parks Canada is of the opinion that the Proponent did not document these potential conflicts sufficiently to allow for a concrete understanding of the effect of tanker passages and their escort tugs on marine observation activities, recreational boating or fishing activities.

Parks Canada also raises uncertainties concerning the mandatory movements that could eventually be required of other marine users in order to respect a safety zone around the tankers. Nevertheless, Parks Canada considers that the Proponent's commitment to ensure harmonious cohabitation and compatible practices between its activities and those already taking place in the Saguenay Fjord should be sufficient to prevent most of the effects on other marine users.

In the event that additional travel is required by marine users, the Proponent has committed to consider modifying certain operational practices, for example, by changing the schedule of tanker passages. Parks Canada is of the opinion that the involvement and consultation of the advisory committees and the tourism industry consultation table before the start of the operation phase could minimize the residual effects on other marine users, particularly with regard to the procedures to be implemented and the navigation schedules.

The Agency believes that the reduction of speed to 10 knots by the Project vessels, and the compliance with boating regulations by other users of the Saguenay River, would avoid a significant disruption of recreational and tourism activities that take place in the sector. These measures would also mitigate the effects of waves generated by the passage of vessels and reduce the effects on ice and winter fishing. The Agency considers that the mitigation measures described in section 5.9.2 would mitigate the safety risks resulting from the cohabitation of tankers and pleasure craft users.

Effects on commercial fisheries

The Agency considers that the socioeconomic conditions related to the activities of the First Nations on the St. Lawrence Estuary could be affected if an accident were to occur in this sector. However, the Agency is of the opinion that the Project is unlikely to cause significant adverse environmental effects due to accidents or malfunctions, given the implementation of mitigation, prevention and control measures as well as the risk

management program, including the emergency measures plan (section 6.1 - Effects of accidents and malfunctions).

Cumulative Effects

The Agency agrees with the Proponent that the Project would not result in significant cumulative effects on most of the fjord's landscapes, which could affect socioeconomic conditions related to recreational tourism. The Agency is concerned about the cumulative effects that this increase in marine traffic could have on socioeconomic conditions related to recreational tourism. These effects are likely to lead to a reduction in the wild and intimate character of the fjord and thereby reduce the attractiveness of the region and of recreational tourism activities such as marine mammal watching in the Saguenay Fjord and the St. Lawrence Estuary.

With regard to the cumulative effects of the increase in marine traffic on recreational and tourism uses, the Agency notes that the 300 to 400 annual tanker passages associated with the Project, combined with those that could result from other projects under development in the region, could triple commercial navigation in the Saguenay River. The Agency is concerned about the cumulative effects that this increase in marine traffic could have on marine mammal observation activities in the Saguenay Fjord and the St. Lawrence Estuary.

The Agency believes that the cumulative effects of marine traffic on marine mammals could, in the medium and long term, lead to a reduction in the quality of recreational tourism activities, either by reducing the diversity of species to be observed or by losing the wilderness character of the region. Furthermore, the increase in merchant ships in a protected area where the beluga whale is one of the main tourist attractions is not in keeping with the park's conservation objectives or with the spirit of the place that makes the Saguenay an exceptional place. This loss of the natural tourist attractions of the region and the marine park could lead to a decrease in the number of visitors to the region and concomitant economic losses.

Conclusion

The Agency concludes that the adverse effects on user cohabitation and on sport and commercial fisheries would be low with the implementation of the proposed mitigation measures.

The Agency also concludes that, with the implementation of the key mitigation measures identified below, the Project is not likely to cause significant adverse environmental effects, direct and cumulative, on socioeconomic conditions related to recreational tourism and marine mammal watching. However, moderate effects are likely to occur.

The Agency's evaluation is based on the socioeconomic impact assessment criteria included in Appendix A and the following findings:

- The magnitude of potential effects of the Project would be moderate. Significant adverse effects on beluga whales would result in changes to the activity, but the practice of the activity would not be directly compromised. Visitors would be able to continue marine mammal watching activities in the park.
- The extent of these effects would be regional and long-term;

- Effects would be partially reversible, as viewing activities could be altered due to the effects of the Project on beluga whales, as well as the loss of the wilderness character of the Saguenay, but could partially recover due to the presence of other marine mammals and other natural attractions in the area. Effects would be intermittent in time, occurring during the summer marine mammal watching season.

Determination of Key Mitigation Measures

The Agency has identified key mitigation measures required to mitigate several potential effects of the Project on socioeconomic conditions. In determining the key mitigation measures, the Agency considered the mitigation measures proposed by the Proponent, the advice of government authorities, as well as comments received from consulted First Nations and the public. These measures are as follows:

- Implement key measures regarding:
  - Beluga whales and other marine mammals, presented in the section 5.2.2;
  - Fish and fish habitat, presented in the section 5.3.2;
  - Current use of lands, presented in the section 5.7.2;
  - Physical and cultural heritage, presented in the section 5.8.2;
  - Human health, presented in the section 5.10.2;
  - Accidents and malfunctions, presented in the section 6.1.2.
- Identify, prior to construction, parties potentially affected by the Project or by any environmental effects of the Project, including representatives of local and municipal governments, residents and users in the immediate vicinity of the Project, and community, environmental, recreational, tourism, economic and commercial organizations operating on the Saguenay River. For any measures that apply to the operation, potentially affected parties also include parties that operate along the St. Lawrence Estuary. Provide a list of potentially affected parties applicable to each phase of the Project, including contact information, to the Agency prior to construction and provide an updated list to the Agency upon request during any phase of the Project;
- In consultation with potentially affected parties and First Nations, develop a communication plan and implement it for the construction phase, the operation phase and for the closure phase to inform of any activities that may affect recreational and tourism businesses in the Project area, users of the Saguenay River, users practising nautical activities in the vicinity of the site, fishing and any other recreational and tourism activities, as well as commercial navigation stakeholders. The plan shall include:
  - A schedule detailing the dates and times of work that could generate nuisances for local communities and recreational and tourist users in the sector (for example, preparation and construction work on marine infrastructure requiring vibro-drilling of piles, construction of access roads to the site, blasting, drilling). The schedule will have to detail the periods of work that will be carried out in the water in order to allow users to adapt their recreational and tourism activities in the sector;
  - Any other information relevant to the users and boaters of the Saguenay River in the Project area, the First Nations concerned and any other party involved or affected by the Project.

- In consultation with potentially affected parties, including First Nations, develop and implement a communication plan, for the operation phase, to inform recreational tourism businesses operating along the Saguenay River and the St. Lawrence Estuary, users of the Saguenay River, users practising nautical activities in these sectors, fishing and any other recreational tourism activity, as well as commercial navigation stakeholders, including:
  - The timeframe for the passage of tankers between the mouth of the Saguenay River and the Project site;
  - The schedule of presence of the tankers in berth;
  - Schedules of tanker loading operations;
  - Navigation measures to be respected by recreational boaters and commercial vessels transiting near the Project site or docking at the Marcel-Dionne Wharf (Port of Grand-Anse).
- Establish a protocol for receiving complaints regarding environmental effects caused by any component or activity of the Project and associated issues (including changes to air quality and noise exposure). Implement the protocol from the start of construction and throughout all phases of the Project. As part of the protocol implementation:
  - Communicate the details of the protocol, including how to file a complaint and the timeframes within which the developer commits to respond to the complaint, to community members in the manner determined during the development of the protocol;
  - Acknowledge any complaint received as quickly as possible, or within 48 hours of receipt of the complaint, and implement, as soon as technically feasible, any corrective measures under the responsibility of the proponent in response to any complaint received, which may include modified or additional mitigation measures;
  - Document any complaints received (including a description of the reason for the complaint) and how the Proponent responded to the complaint, including any modified or additional mitigation measures implemented or planned, or why no modified or additional mitigation measures are required to respond to the complaint. Also document any feedback received from the party submitting the complaint regarding the Prponent's response to the complaint.
- Develop, prior to the commencement of the operation phase and in cooperation with the appropriate authorities, and implement during operations, a Saguenay River navigation policy applicable to tankers associated with the Project, including when passing or crossing any other commercial vessel. Submit the policy to the Agency prior to operation.

Need for Follow-up and Follow-up Requirements

In addition to the follow-up programs relevant to socioeconomic conditions that have also been identified in Sections 5.2 - Marine mammals, including the beluga whale, 5.4 - Fish and Fish Habitat, 5.8 - Physical and Cultural Heritage, and 6.1 - Accidents and Malfunctions, the Agency recommends that the follow-up program include the following requirements, in order to verify the prediction of effects on socioeconomic conditions as well as the effectiveness of proposed mitigation measures:

- Develop, in collaboration with First Nations who demonstrate an interest, a follow-up program on the effects of the Project and the effectiveness of the mitigation measures on their socioeconomic activities, particularly for actovotoes related to the observation of marine mammals, for the operation phase of the Project;
- Establish a monitoring and follow-up committee composed of representatives of the Proponent, recreation and tourism businesses, including First Nations, representatives of residents in the Project area, and other regional stakeholders such as the Saguenay-St. Lawrence Marine Park and the Saguenay Fjord National Park, as well as representatives of the various levels of government. This committee will have to examine the effectiveness of mitigation measures on socioeconomic conditions, particularly marine mammal watching activities in the Saguenay Fjord and the St. Lawrence Estuary. As part of the follow-up program:
  - Determine, during the development of the follow-up program, the indicators that will be used to verify the accuracy of the environmental assessment and judge the effectiveness of the mitigation measures with respect to socioeconomic conditions, particularly marine mammal watching activities and commercial green sea urchin fisheries;
  - Discuss, during the development of the follow-up program, opportunities for parties consulted during the development of the follow-up program to participate in the implementation of the follow-up program (including data collection), and allow for the participation of any interested parties;
  - Monitor annually the environmental effects caused by the Project on socioeconomic conditions, including marine mammal watching activities in the Saguenay Fjord and the St. Lawrence Estuary, based on identified indicators;
  - Develop and implement modified or additional mitigation measures that are the responsibility of the Proponent if the results of the monitoring demonstrate that modified or additional mitigation measures are required to mitigate the environmental effects caused by the Project on socioeconomic conditions, including marine mammal watching activities in the Saguenay Fjord and the St. Lawrence Estuary.

5.10 Human Health

The Project could result in direct residual effects on human health related to changes in air quality and water quality, as well as acoustic and light environments. However, the Agency believes that these effects are not likely to be significant with the implementation of the mitigation and follow-up measures recommended in Section 5.10.2.

To determine the significance of the health risks, the Agency assessed, in particular, whether the effects of the Project would result in exposing the population to nuisances (noise, light, vibrations, odours, dust) or to levels of contaminants that exceed the applicable standards and criteria for the protection of physical health. The Agency also took into account the perceived risk to health or safety that could be caused by changes to the environment related to the Project.

5.10.1 Analysis of Potential Effects and Proposed Mitigation Measures

Description of the Component

Air Quality

The Proponent notes that the Centre intégré universitaire de santé et de services sociaux du Saguenay-Lac-Saint-Jean carries out interventions in the Project sector and its vicinity concerning cardio-respiratory diseases related to poor air quality, infectious problems or intoxication related to water quality, cancers and intoxication of environmental origin. Respiratory diseases account for 8.8% of all deaths annually and 4% of premature deaths. This type of disease is the second leading cause of hospitalization and the third leading cause of death in the borough of La Baie. Furthermore, an increase in asthma among the population aged 18 and over has been noted in recent years, rising from 9.1% in 2007 to 11% in 2012, representing approximately 2,000 individuals in the borough, mostly women (WSP, January 2019). In 2012, chronic obstructive pulmonary disease affected 5.9% of the adult population of the area or approximately 900 individuals. In addition, 6.6% of adults (1,200 individuals) had a cardiovascular disease, which was the second leading cause of death in La Baie, accounting for 28% of total deaths, after cancer which accounted for 37% of deaths (WSP, January 2019).

More recent data, compiled in the *Enquête de santé du Saguenay-Lac-Saint-Jean 2018* report (CIUSSS-LSJ 2020), show that the percentage of asthma has remained practically unchanged, while chronic obstructive pulmonary diseases have decreased. Thus, in 2018, these diseases affected 4% of the population of La Baie (700 individuals). Heart disease also showed a slight decline (6% or 1,100 individuals).

Industrial and port activities in the project area (Grande-Anse Port facilities and Rio Tinto facilities in the Baie des Ha! Ha!) would be the source of current airborne contaminants. The current air quality would nevertheless be very good, given the location of the Project, which is in a remote and undeveloped area (WSP, January 2019: p. 644). Environment and Climate Change Canada believes that the Project site would also be influenced by emissions from the metallurgical industries in the city of Saguenay, which is located less than 30 kilometres west of the Project, due to the prevailing wind direction.

The regional public health authority points out that 26% of the population of Saguenay-Lac-Saint-Jean uses wood to heat their homes. This percentage rose to 36% in the borough of La Baie in 2018. On this subject, regional public health reminds us that the “deterioration of indoor air quality in dwellings plays an important role in the onset or development of health problems, particularly asthma, allergic rhinitis in winter, irritations and respiratory tract infections” (CIUSSS-LSJ 2020).

Finally, Environment and Climate Change Canada indicates that, as part of the Canada-wide Air Quality Management System, the province of Quebec has delineated three Air Management Zones, including the South Air Management Zone where the Project is located. According to the 2018 progress report (MELCC, 2018), all air quality stations are at a management level of orange for $PM_{2.5}$ (annual) or yellow for $PM_{2.5}$ (24 hours) and ozone. The management objective for the orange level is to “prevent exceedance of the Canadian Ambient Air Quality Standards (CAAQS)” while for the Air Quality Management System yellow level, the

management objective is to “prevent deterioration of air quality.” According to the pan-Canadian Air Quality Management System, it would be important that the implementation of the Project does not contribute to the deterioration of existing air quality and lead to exceedances of the CAAQS.

Environment and Climate Change Canada believes that the air quality baseline condition has been adequately described based on the available data

Acoustic Environment

With regard to the current acoustic environment in the Project sector, ambient noise levels range from 24 dBA to 53 dBA at night and from 27 dBA to 53 dBA during the day. Traffic on Route 172, Saint-Martin Road and Anse-à-Benjamin Road, passing aircraft, the use of agricultural equipment on the south shore and certain residences on the north shore of the Saguenay River are the main sources of noise in the Project sector. According to the characterization of the sector, the Project would fit into a relatively noiseless environment.

Light Environment

The sources of artificial light in the vicinity are mainly located in the boroughs of Chicoutimi and La Baie, at the Port of Saguenay and around certain riverside residences. According to current observations, the Project site corresponds to a low-light zone, relatively far from the influence of the city's more urbanized sectors. The Project area generates little intrusive light towards the receiving stations, which are also classified as low light zones. No light trespass was measured in the terrestrial sector of the Project site.

Drinking Water Sources

The regional public health department estimates that 73% of the population of Saguenay-Lac-Saint-Jean uses municipal drinking water for drinking. Seven percent of the population consumes drinking water from a family well and 19% uses commercial bottled water. 71% of the borough's drinking water comes from the municipal network, 10% from family wells and 18% from commercial bottled water (CIUSSS-LSJ 2020).

No watercourse on the project site feeds a water source used for human consumption. Also, the wells listed are located more than two kilometres from the site, outside the flow zone between the Project site and the Saguenay River.

Potential Effects

Human health effects that could occur during the construction, operational and closure phases of the Project are related to three sources:

1. Degradation of air quality resulting from dust emissions, gaseous contaminants and volatile organic compounds (VOCs) into the air;
2. Disturbances caused by Project’s activities, such as increased levels of noise, vibration and increased artificial light at night;

3. Potential contamination of drinking water through accidental spillage of hydrocarbons or hazardous materials into the environment.

Potential Effects Related to Air Quality

The pollutants analyzed by the Proponent include particulate matter (dust), including total particulate matter (TPM), respirable particulate matter (PM_{10}) and fine particulate matter ($PM_{2.5}$), sulphur dioxide (SO_2), nitrogen dioxide (NO_2), hydrogen sulphide (H_2S) and various gases and total volatile organic compounds (VOCs), such as benzene and ethyl benzene. The results were compared to the Canadian Council of Ministers of the Environment (CCME) standards and the MELCC's Clean Air Regulation.

According to Health Canada, nitrogen dioxide (NO_2) can reduce lung function and aggravate asthma symptoms. Prolonged exposure to low levels may increase the risk of respiratory symptoms such as coughing and wheezing[81]. Nitrogen dioxide (NO_2) is a non-threshold substance, i.e., it has not yet been possible to identify a threshold below which no adverse health effects occur. According to Health Canada, nitrogen dioxide (NO_2) concentrations should therefore be kept as low as possible.

According to the World Health Organization and Health Canada, long-term exposure to fine particulate matter ($PM_{2.5}$) and respirable particulate matter (PM_{10}) increases the risk of developing cardiovascular disease, respiratory disease and lung cancer[82-83]. Fine particulate matter ($PM_{2.5}$) is also a non-threshold substance. Concentrations of fine and respirable particles should therefore be kept as low as possible.

The health effects of sulphur dioxide (SO_2), particularly for people with respiratory problems, include increased lung problems, hospital admissions and medical visits (Health Canada, 2018b).

According to Health Canada, while the Proponent considered several important contaminants, consideration of ozone, diesel particulate matter and volatile organic compounds (VOCs), the latter individually rather than in total, would have been desirable.

During the construction phase, site preparation work and the use of machinery would emit gaseous and particulate contaminants into the atmosphere. To describe the effects of the Project on air quality, the Proponent estimated the emission rates of contaminants from the construction works (WSP, April 2019), no atmospheric dispersion modelling was performed. Thus, the environmental effects of the Project would result in deterioration of air quality during construction through high emissions of dust and other gaseous contaminants (construction equipment, blasting, concrete mixers, etc.). Thus, occurrences of peak concentrations of contaminants could occur and affect air quality. Although these emissions would be localized, they could spread to sensitive receptors. According to Environment and Climate Change Canada, blasting activities could be a significant source of emissions.

[81] Health Canada "Nitrogen dioxide": https://www.canada.ca/en/health-canada/services/air-quality/indoor-air-contaminants/nitrogen-dioxide.html
[82] WHO "Particulate matter – Definition and principal sources": https://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health
[83] Government of Canada "Health effects of air pollution": https://www.canada.ca/en/health-canada/services/air-quality/health-effects-indoor-air-pollution.html

According to Environment and Climate Change Canada, modelling would have been useful to determine the extent of atmospheric dispersion of contaminants and their concentrations. It would also have had the advantage of locating the locations (sensitive receptors) where air quality could be affected by construction activities and better target mitigation measures in relation to construction activities.

In the operational phase, the activities likely to generate effects on air quality are mainly related to the natural gas liquefaction facilities. Emissions from infrastructure and support facilities, ships at berth and in motion would also contribute to potential environmental effects (WSP, January 2019). The effects were documented by modelling the atmospheric dispersion of contaminants and their concentrations in the study area (WSP, January 2020). The Proponent presented nine scenarios to consider different sources or realities and to identify the sources likely to have the greatest effect. The Proponent considered air contaminants already present in the environment (sulphur dioxide [SO_2], nitrogen [O_3] and particulate matter [TPM, PM_{10}, $PM_{2.5}$]) by adding initial concentrations to the atmospheric dispersion model. For other contaminants, where available, initial concentrations were estimated using MELCC criteria and Schedule K of the Clean Air Regulation.

The results indicate that the criteria and standards (provincial and federal) would be met during the operational phase for the scenarios considered and the contaminants modelled, with the exception of nitrogen dioxide (NO_2) and sulphur dioxide (SO_2) for the CAAQS. Oil-fired heating systems would contribute about 60% of the nitrogen dioxide (NO_2) exceedances, while thermal oxidizers would contribute almost 100% (99%) of the sulphur dioxide (SO_2) exceedances. With respect to the effects on sensitive receptors, i.e., 71 residences and 11 cottages identified in the modelling domain, there would be SO_2 exceedances at the one-hour CAAQS 2025 standard under the baseline scenario, and under the annualization scenario, there would be one-year SO_2 exceedances at the CAAQS 2020 and 2025. According to the Proponent, the residual effect on air quality was rated as moderate and insignificant for the construction, operational and closure phases, but while standards are met for most contaminants at sensitive receptors, the effects would not be temporary and reversible during the operational phase of the liquefied natural gas plant and terminal.

The effects of marine shipping on air quality were also analyzed. Thus, ship emission rates were estimated along the Saguenay River and the St. Lawrence River up to Les Escoumins (WSP, June 2020). The modelled concentrations meet CCME standards for all contaminants considered.

Environment and Climate Change Canada believes that the potential environmental effects have been described in a generally adequate manner, although gaps and uncertainties remain, particularly in relation to construction and site closure activities, notably because the Proponent did not conduct modelling for these two phases and the description of the effects is qualitative. Also, the Proponent did not provide precise information concerning the levels of particulate matter emitted by blasting activities. Concerning the operational phase, the use of generic values recommended for northern projects in the Clean Air Regulation to estimate initial concentrations of nitrogen dioxide (NO_2) could result in an underestimation of the actual concentrations of this contaminant.

For its part, Health Canada believes that the modelling presented is adequate to assess the potential air quality impacts that could have health effects. The baseline concentrations of key contaminants that could have health effects, including nitrogen dioxide (NO_2), sulphur dioxide (SO_2) and fine ($PM_{2.5}$) and respirable (PM_{10}) particulate matter, and the potential human receptors were clearly presented. Again, the fact that no

dispersion modelling of air contaminants has been carried out for the construction phase does not allow the full exposure potential associated with the Project to be assessed.

The public, particularly those living in the Project area, have expressed concerns about the effects of the Project on human health in relation to air quality, particularly in relation to the exceedance of the nitrogen dioxide (NO_2) emission standard, the management of dust from the construction site and odour nuisance. The effects of other industrial activities in the area that could combine with those of the Project was also a concern raised.

The Canadian Association of Physicians for the Environment – Quebec (CAPE) believes that emissions from the future liquefaction plant should be considered to induce physiological and epidemiological effects, as established in recent studies that show a correlation between air pollution and increased cardiovascular and respiratory disease. The group also reports that air pollution is classified as a confirmed human carcinogen by the International Agency for Research on Cancer, an agency of the World Health Organisation.

Potential Effects Related to Noise and Vibration

The potential effects of noise and vibration can lead to irritability if they are repetitive, loud, of long duration and continuous. At night, intense noise and vibration can affect sleep. During the consultations organized by the Proponent, potential noise effects emerged as a source of concern for a portion of the population. The Proponent carried out modelling to estimate the noise levels at the human receptors closest to the site.

Noise sources during construction would be primarily related to the use of trucks, bulldozers, hydraulic shovels, graders, wheel loaders, crushers and compactors (WSP, April 2019). Noise from increased road traffic during the construction phase was also considered (WSP, January 2019; WSP, December 2020). During operation, the main sources would be compressors, chillers, condensers and turbines (WSP, April 2019). Generators on board liquefied natural gas carriers were also considered. However, noise related to the arrival and departure of liquefied natural gas tankers and pile driving was not included in the modelling. According to Health Canada, this is a source of uncertainty.

The increase in the percentage of people seriously affected (%HA) was also estimated for the construction and operational phases[84]. Modelling results for all three phases of the Project indicate that noise and vibration would be below the noise criteria established by federal and provincial governments. The Proponent believes that the noise increases caused by the Project would have insignificant health effects, but Health Canada believes that compliance with noise guidelines or standards does not necessarily mean no effect. The response of communities to increased noise levels can thus vary considerably from one community to another.

[84] The percentage of the population highly annoyed (%HA) is used to calculate how a typical community responds to a given noise level (dose-response relationship between noise levels and annoyance generated according to ISO-1996-1). Health Canada recommends that noise impact be assessed in terms of changes in the %HA of 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 establishing the existence of a severe noise-related impact from a project (Health Canada, 2017).

Health Canada considers that the approaches used by the Proponent to make noise projections represent good practices and normally make it possible to reduce the uncertainty of the results. It also considers that the criteria and indicators used by the Proponent to assess the potential noise effects of the Project are appropriate. Human receptors in the vicinity of the site appear to have been well considered in the modelling.

The public expressed concerns about the frequency and intensity of noise generated by the Project's equipment, including that of the Project's vessels. On this point, the Collectif de l'Anse-à-Pelletier pointed out that the noise modelling for the operational phase does not include any documentation of the noise emitted by the docked vessels and their generators. Since the ships currently docking at the Marcel-Dionne wharf can easily be heard as far away as Anse-à-Pelletier, the Collectif is concerned that the ships will also constitute a noise nuisance in the area given their much larger size. The 200 ships per year associated with the Project would ostensibly increase the noise nuisance, especially compared to the fifty or so ships that use the Marcel Dionne wharf each year.

Potential Effects Related to the Light Environment

The Project would be located in an area of low light levels with little light intrusion to the receptors. The main effects of the increase in brightness would be felt in the operational phase. Lighting from the liquefaction terminal and loading platforms would be clearly visible from the north shore of the Saguenay River, particularly from the Parc Aventures Cap Jaseux. The presence of new artificial light sources would affect the quality of the nighttime landscape in the sector. Depending on weather conditions, a slight halo of light projected towards the sky would be visible but would blend in with that of the ville de Saguenay boroughs (WSP, December 2020).

The public expressed concerns about the light impact generated by the various components of the Project in the operational phase (for example, flare pilots, light sources on the wharf and the rack) as well as the cumulative effects of the Project with those of other nearby projects. The Collectif de l'Anse-à-Pelletier also points out that the potential effects of the Project on the mental health of local residents were not addressed by the Proponent in its Impact Statement. In this regard, the sight of a project related to the extraction and export of fossil fuels, as well as the presence of industrial facilities, would be a source of stress and frustration for a population that has chosen to live in nature, 35 kilometres from the urban sector. According to them, this would be a major suffering for their community.

The Proponent recognizes that, for residents who value the environment in which they live because of its natural and isolated character, the announcement of the development of an industrial project that can be seen both day and night can give rise to fears and worries that generate stress. In response to these concerns, the Proponent states that there is a significant gap between the technical assessment and the citizen's assessment of the risks. This perception of risk can lead to psychosocial reactions and affect the health of individuals who experience intense and prolonged reactions. The scientific literature consulted by the Proponent indicates that two-way communication and consideration of stakeholders' concerns can reduce stress and other psychosocial impacts (WSP, December 2020). In this regard, the Proponent recalls that its participatory approach targeting local communities was implemented early in the process, in 2014.

Health Canada stresses the importance for the Proponent to maintain its communication approach. It is desirable to opt for transparent risk communication, even if the Proponent considers that citizens' concerns are more related to perceptions than to real risks. Real or perceived risks must be the subject of constant dialogue between the Proponent and the citizens concerned by the Project.

Potential Effects Related to Water Contamination

The Proponent points out that the watercourses studied do not directly supply the area's residents with drinking water or water for other uses. It nevertheless confirms that no contaminants will be released into the environment and that runoff, sanitary and industrial water (from the demineralization of municipal water) would be managed by rainwater or sanitary collection system, as the case may be. The quality of well water would not be affected by the Project.

With regard to risks in the marine environment related to accidents or malfunctions involving the tankers, a spill could affect the quality of the water and the natural environment as well as the fishery resources consumed in the downstream area. These risks are discussed in Section 6.1 – Effects of Accidents and Malfunctions. Although adverse effects are possible due to accidents or malfunctions, these effects are unlikely to be significant, given the implementation of mitigation, prevention and control measures and the risk management program.

The possibility of water contamination from a major spill remains a concern for some citizens, despite the announced mitigation measures. For these people, these concerns may generate stress and other psychosocial reactions. The health of individuals who experience these intense and prolonged reactions could be affected. As with the health effects related to light and noise, the communication and follow-up process planned by the Proponent with the communities would make it possible to respond to and reduce these potential effects.

The Pekuakamiulnuatsh First Nation is concerned about water contamination and its effects on animals harvested by its members, such as salmon, sea trout or migratory birds. Regarding the contamination of traditional food, Health Canada notes that the Proponent did not assess the health effects associated with the ingestion of food potentially contaminated by an accidental spill of hydrocarbons or other substances.

Mitigation and Follow-up Measures Planned by the Proponent

The Proponent recognizes that compliance with environmental regulations does not necessarily guarantee the absence of health effects. It therefore undertakes to make every technically feasible effort to reduce air emissions to a minimum, including those for which there is no known health effect threshold (WSP, December 2020, p. 9). In particular, it points out that the use of a range of electrical equipment will reduce air emissions for several contaminants. It proposes several other mitigation measures to reduce air emissions during the different phases of the Project, including fine particles and nitrogen oxides.

To mitigate the effects of increased noise levels on human health, the Proponent undertakes, among other things, to implement a worker awareness program to control noise, vibration and dust generated by construction, and to optimize the Project's infrastructure during the design of the liquefaction complex in order to reduce noise levels during operation. The Proponent would also implement a complaint

management system to facilitate community trust building and mitigate social risks. Although the complaint management system is not a mitigation measure per se, Health Canada considers its implementation important. This system would allow, if necessary, to adapt existing measures or to identify additional mitigation measures to be put in place. The complaint management and monitoring register would also benefit from documenting the satisfaction of the parties involved in the resolution of complaints.

As for the mitigation measures for the light environment generated by the Project, the Proponent confirms that it took into account the opinions shared by the stakeholders during the consultations. Thus, it modified the preliminary lighting concept and retained several mitigation measures related to the landscape and the light environment.

With regard to follow-up measures, the Proponent has committed to implementing several environmental and social management programs (WSP, January 2019). In particular, it has committed to implementing an air quality monitoring program and a specific Air Quality Management Plan (WSP, January 2019, p. 1020) including, among other things, the prevention and control of dust and polluting emissions for the construction and closure phases. For the operational phase, this plan will address sources of fugitive emissions, especially. The Proponent also plans management programs for noise monitoring of Project's activities, for light environment and lighting, and for surface and groundwater quality (see Section 5.3 - Fish and Fish Habitat). It also committed to implementing a follow-up program with local and regional communities to assess the effectiveness of the proposed measures to mitigate social and human impacts during the operational phase. One component of this program would focus on the perception of nuisances (noise, dust, contaminants, landscape and lighting) and risks associated with the Project by local residents and users of the environment, as well as on the psychosocial reactions associated with these perceptions. According to the Proponent, the results of the follow-up would make it possible to adjust the mitigation program to better respond to the perceptions and psychosocial impacts identified.

5.10.2 Agency Analysis and Conclusions on Residual Effects

The Agency considers that, taking into account the implementation of the key mitigation measures listed below, the Project is not likely to cause significant adverse effects on human health in relation to changes to air quality, surface water and noise and light environments.

Analysis of the Effects

Health Effects Related to Air Quality

The Agency shares the opinion of Environment and Climate Change Canada and considers that, although the standards are met for most air contaminants at sensitive receptors, the Project would necessarily have an impact on air quality in general during the operational phase, particularly because of the future increase in ship traffic. In light of the anticipated exceedances and the uncertainties outlined above, the mitigation, monitoring and follow-up measures planned by the Proponent are adequate if they are implemented in a timely and rigorous manner.

The Agency agrees with Health Canada and considers that it would have been important for the Proponent to address the potential health effects of exposure to concentrations below federal and provincial standards. Studies have shown that for certain air contaminants such as nitrogen dioxide (NO_2) and fine particles ($PM_{2.5}$), there are no concentrations below which there would be no health effects (non-threshold substances). In other words, for these substances, even if there are no significant exceedances of the standards, there is still a risk to human health. In a recent report, Health Canada (2016) points out that, if a threshold were established for the health effects of nitrogen dioxide (NO_2), it would likely be close to the lower limit of ambient nitrogen dioxide (NO_2) concentrations. Therefore, any increase in ambient nitrogen dioxide (NO_2) concentrations is accompanied by an increased risk of health effects, including mortality.

In addition to compliance with environmental regulations, the objective of mitigation measures should be to minimize the emission of pollutants into the air, consistent with the principles of keeping clean areas clean and continuously improving air quality of the Canadian Ambient Air Quality Standards (CAAQS; CCME, 2019). This would be particularly important for non-threshold substances. The commitment of the Proponent to deploy technically feasible means to minimize emissions to air of substances for which there is no known threshold for health effects is therefore very important.

Health Effects Related to Noise

The Agency agrees with Health Canada and considers that, if the noise levels measured in the field during the operation of the complex prove to be similar to the levels modelled in the Impact Statement, they should not have any adverse effects on the health of neighbouring populations. It is important to note, however, that the Project would be located in a very low-noise environment and that a small increase in noise levels, although within the standards, could affect the local community. Since noise can have harmful effects on health (particularly in terms of sleep disturbance or long-term discomfort/nuisance), and given the uncertainty regarding noise related to the arrival and departure of tankers and pile driving, the Agency considers that the implementation of the mitigation, monitoring and follow-up measures presented in the Impact Statement is necessary.

As indicated by Health Canada, it is important to communicate to the community the periods when noisy activities would take place (for example, blasting, pile driving or increased traffic). Indeed, according to Health Canada, it has been shown that fewer noise-related complaints are reported when the information is accurate and does not underestimate the noise (Health Canada, 2017). Thus, the Agency believes that a communication plan should be developed and implemented before the work begins.

Finally, in addition to the communication plan, the Agency considers that the implementation of a complaint management system is essential and would allow the Proponent to adjust existing measures or identify additional measures in the event that the effects of noise prove to be more significant than those analyzed in the Impact Statement.

Health Effects Related to the Light

The Agency believes that the implementation of the proposed mitigation measures related to changes in light levels would reduce the effects on the health of communities surrounding the Project site. Despite the mitigation measures, these changes, as well as changes in noise levels, could nevertheless remain a source

of stress and anxiety for some individuals who place a higher value on the current environment or who would be more exposed to changes in the nighttime landscape or to noise. The Agency believes that the implementation of the environmental management program relating to lighting and light environment and the local community monitoring program will enable the Proponent to assess the health effects of nuisances in more detail and to put in place additional measures in the event that more significant effects are felt.

Health Effects Related to Water Contamination

The Agency is generally satisfied with the assessment of effects presented by the Proponent. However, due to the lack of data on toxicological or carcinogenic risks related to the contamination of fisheries resources in the event of a marine spill, uncertainties remain regarding the potential effects of the Project on First Nations country food.

Health Canada notes that the Proponent provided a list of municipalities included in the analysis of accident risks related to marine shipping of liquefied natural gas, but did not provide information on the presence of drinking water intakes. The ministry recommends that the Proponent engage in a dialogue on drinking water treatment capacity and potential changes to water quality in the event of spills or accidental releases with all potentially affected municipalities.

The Agency supports Health Canada's recommendation that all measures aimed at informing the stakeholders concerned by the potential effects on water quality (recreational and drinking) in advance should be implemented.

Conclusion

The Agency concludes that, taking into account the implementation of the key mitigation measures identified below, the Project is not likely to cause significant environmental effects on human health. The Agency finds that the Project poses little risk to human health related to changes to the acoustic and light environments and water quality. Moderate effects related to changes in air quality are, however, likely to occur. The Agency's assessment is based on the human health effects assessment criteria included in Appendix A and on the following findings:

- The magnitude of potential effects of the Project would be moderate. Some effects could occur in relation to exceedances of criteria and standards regulating sulphur dioxide (SO_2) and non-threshold substances such as nitrogen dioxide (NO_2).
- The extent of these effects would be local and long-term, extending beyond the local area and throughout the life of the Project;
- These human health effects would be continuous over time as the liquefied natural gas plant and tankers would contribute to air quality degradation and potential health effects throughout the operational phase. These effects could be partially reversible if air quality recovered to baseline values after plant closure.

Determination of Key Mitigation Measures

In addition to the measures mentioned in sections 5.1.2, 5.3.2, 5.8.2 and 6.1.2, the Agency has identified the key mitigation measures required to ensure that the Project does not cause significant adverse environmental effects on human health. The Agency has taken into account the mitigation and compensation measures proposed by the Proponent, the advice of government experts, and the comments received from consulted First Nations and the public. The key mitigation measures are as follows:

Air Quality

- Identify, prior to construction and in consultation with the relevant authorities, receptors likely to be affected by the environmental effects on human health of changes in air quality caused by the Project and submit the list of receptors to the Agency prior to construction;
- Determine, prior to construction, the meteorological conditions for the limited study area that are conducive to dust emissions from the Project, including drought conditions and wind conditions. Of these conditions, identify high wind conditions during which blasting should not take place. Present these conditions to the Agency prior to construction;
- Implement measures to reduce dust emissions from the Project at all phases. As part of these measures:
  - Develop the limited study area and optimize construction activities to minimize time and distance travelled between sites and equipment movements;
  - Pave access roads (including temporary access roads with temporary pavement) and unpaved road surfaces constructed as part of the Project as soon as technically and economically feasible and repair any damaged paved areas as soon as technically feasible;
  - Continuously clean and water as required the surfaces of the restricted study area (including areas where stripping, grading and blasting activities take place) to reduce dust generation and transport beyond the boundaries of the area;
  - Minimize the drop height of loading and unloading activities of any granular material required by the Project to the lowest technically feasible height;
  - Cover open loads of granular material during transport;
  - Minimize the area of blasting banks to the smallest technically feasible area;
  - Maintain a blasting mattress during any blasting event;
  - Temporarily cease all blasting associated with the Project during high wind conditions. Resume blasting when conditions permit;
  - Temporarily cease all Project's activities when weather conditions are conducive to the emission of dust that may result in the transport of dust to sensitive receptors. Resume activity when conditions permit.
- Reduce loss of bare soil due to wind or rain during construction, including :
  - Fill in bare soil as soon as technically feasible, especially during the construction of the vegetated embankment;
  - Cover bare soil daily with waterproof sheets, as soon as work is completed for the day.

- Give preference, through the tendering process, to contractors and suppliers of transport services required for the Project to those with superior environmental performance, especially for mitigating changes to air quality.

Acoustic Environment

- Carry out any construction activities that may generate noise beyond the property lines under its jurisdiction (including blasting activities and activities requiring the use of heavy equipment, off-road trucks, drills, crushing equipment, generators and compressors) during daylight hours (7:00 a.m. to 7:00 p.m.) from Monday to Friday (excluding holidays);
- Use vibratory driving rather than pile driving for the installation of piles required for the Project;
- During construction and operation, educate truck and bus drivers serving the Project on the speed limits applicable inside and outside the restricted study area and the importance of reducing the use of compression brakes and performing regular maintenance on their vehicles, including exhaust and emission control systems;
- Optimize the soundproofing of noise-emitting equipment and components of the liquefaction plant associated with the Project, including :
  - Install sound insulation or absorption devices around noisy rotating equipment and equipment likely to transmit vibration noise emissions and inside buildings;
  - Use air coolers equipped with noise reduction devices;
  - Install compressors that have a maximum sound power of 85 dBA at one metre from the compressor.
- Equip vehicles and equipment operated under the Project with very low dispersion curve back-up alarms that meet the applicable safety requirements.

Light Environment

- Install and maintain the flares required for the Project horizontally and contained within the thermal protection walls;
- Install lighting required to access the top of the tanks on the opposite side of the tanks to the Saguenay River.

Need for Follow-up and Follow-up Requirements

In order to verify the predictions of human health effects and the effectiveness of the proposed mitigation measures, the Agency recommends that the follow-up program include the following requirements:

- Develop, prior to operation and in consultation with the appropriate authorities, and implement, during operation, 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 environmental effects of the Project on health, including the psychosocial reactions of the neighbouring populations and users of the environment to the perception of a nuisance and risk caused by the Project in terms of noise, dust, contamination, light and changes to the landscape. Develop and implement modified or additional

mitigation measures if the results of the follow-up program demonstrate that such measures are necessary to mitigate environmental health effects, including psychosocial responses to perceived nuisance and risk caused by the Project;

- Prior to construction and in consultation with the relevant authorities, develop and implement a follow-up program to verify the accuracy of the environmental assessment and assess the effectiveness of mitigation measures with respect to the environmental effects of the Project on health caused by changes in air quality. The Proponent shall take into account applicable air quality standards and criteria, the Canadian Council of Ministers of the Environment Management guide for atmospheric management areas, management levels established under the Canadian Ambient Air Quality Standards, and baseline air quality conditions when developing and implementing the follow-up program. In implementing the monitoring program:
  - Monitor, during construction, the concentrations of nitrogen dioxide (NO_2) and sulphur dioxide (SO_2), total particulate matter (PMT), respirable particulate matter (PM_{10}) and fine particulate matter ($PM_{2.5}$);
  - Monitor, at least during the first three years of operation, the concentrations of nitrogen dioxide (NO_2) and sulphur dioxide (SO_2);
  - Compare monitoring results for fine particulate matter ($PM_{2.5}$), nitrogen dioxide (NO_2) and sulphur dioxide (SO_2) to Canadian Ambient Air Quality Standards in effect at the time the monitoring is conducted and for respirable particulate matter (PM_{10}) to World Health Organization guidelines;
  - Develop and implement modified or additional mitigation measures if monitoring and comparison results demonstrate that modified or additional mitigation measures are required to mitigate the environmental health effects of the Project due to changes in air quality;
  - Determine, by the end of the third year of operation and in consultation with the parties consulted in the development of the follow-up program, and based on the results of the monitoring and comparisons conducted, whether additional monitoring is required. If additional monitoring is required, the Proponent shall update the follow-up program and implement the additional follow-up program requirements.
- Develop, prior to construction and in consultation with the relevant authorities, and implement during operation, 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 environmental effects of the Project on health caused by noise, including noise generated by tanker while docked at the Project site. Develop and implement modified or additional mitigation measures if the results of the monitoring program demonstrate that noise generated by the Project, including noise generated by tankers while docked, exceeds the noise levels modelled during the environmental assessment and that modified or additional mitigation measures are necessary to mitigate the environmental health effects caused by noise.

6. Other Effects Considered

6.1 Effects of Accidents or Malfunctions

Accidents[85] and malfunctions[86] can occur at any phase of the Project, which may cause adverse effects on the surrounding environment. However, the Agency considers the Project is unlikely to cause significant adverse environmental effects due to accidents or malfunctions. The Proponent has correctly identified and described the risks associated with its Project and would implement adequate preventive measures.

6.1.1 Analysis of Potential Effects and Proposed Mitigation Measures

Description of the Component

In addition to existing at every phase of the Project, the likeliness of accidents or malfunctions may increase due to environmental factors that could damage terrestrial and marine infrastructure. The effects of the environment on the Project, such as floods and earthquakes, are reviewed in section 6.2.

Determination of Risks of Accidents and Malfunctions

Vulnerability areas and sensitive elements

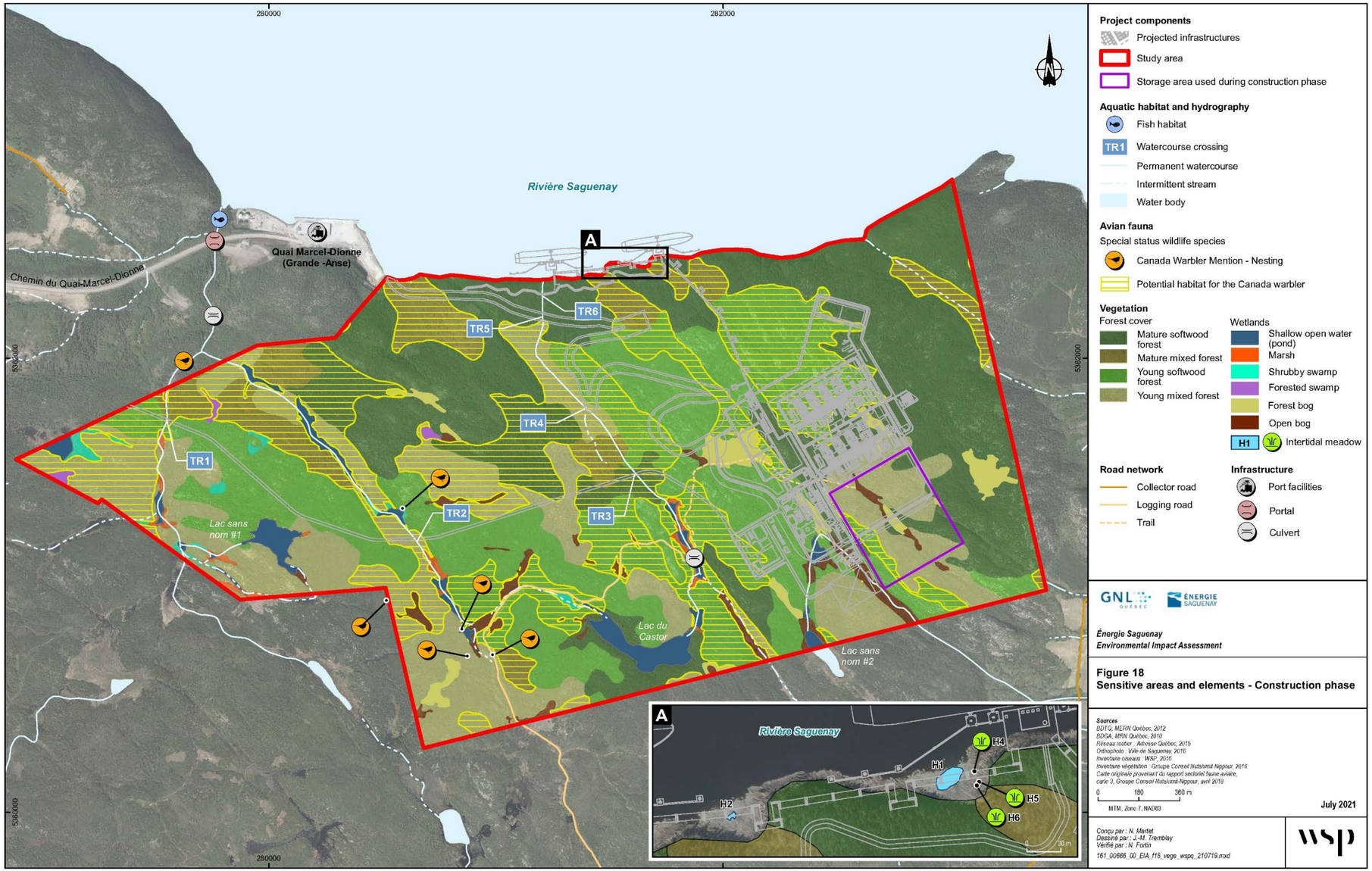
The Proponent surveyed the vulnerability areas and the sensitive elements, in the terrestrial and marine environments, that could be affected by accidents or malfunctions. The vulnerability areas for the marine environment were determined based on the major technological risks related to marine shipping of liquefied natural gas along the route between Les Escoumins and the Project site. The sensitive elements were considered due to their proximity, because they could be affected by a major accident occurring on the Project site or involving tankers. This mainly involves the local population, public places, infrastructure and sensitive or protected environmental elements. The sector downstream from the Saguenay River, its mouth and the La Baie and Saint-Fulgence sector are sensitive zones that could be affected particularly due to the presence of the critical beluga habitat in the Saguenay, which includes several areas of high presence of marine mammals, visits by recreational tourists, and the La Baie and Chicoutimi boroughs of Ville de Saguenay, the most densely populated sector of the expanded study area. The mooring area in the Les Razades sector, where tankers could anchor while awaiting access to the facilities, was also taken into consideration by the Proponent in its assessment of the risks of major technological accidents.

[85] In the context of environmental assessment, an accident is described as an unexpected and sudden event involving components or activities of the Project, which leads to damage to valued components.
[86] A malfunction is described as the inability of equipment or a system to function as foreseen and which leads to damage to valued components.

The permanent and secondary residences closest to the projected facilities are located more than one kilometre east and about three kilometres west. The terrestrial and riparian flora, terrestrial fauna and the avifauna, fish and fish habitat, marine vegetation and intertidal seagrass beds, benthic and nektonic invertebrates and marine mammals could also be affected by accidents or malfunctions. Figures 16 and 17 present the sensitive elements near the Project site, for the construction and operational phases. Environment and Climate Change Canada is satisfied with the description and mapping of the sensitive elements of the environment (natural and human environment) that could be affected by accidents and malfunctions on land and in the river. Nevertheless, this department considers that the risk analysis should take into account a certain portion of the river corresponding to the approach and exit corridors of ships due to the unique character of the mouth of the Saguenay River.

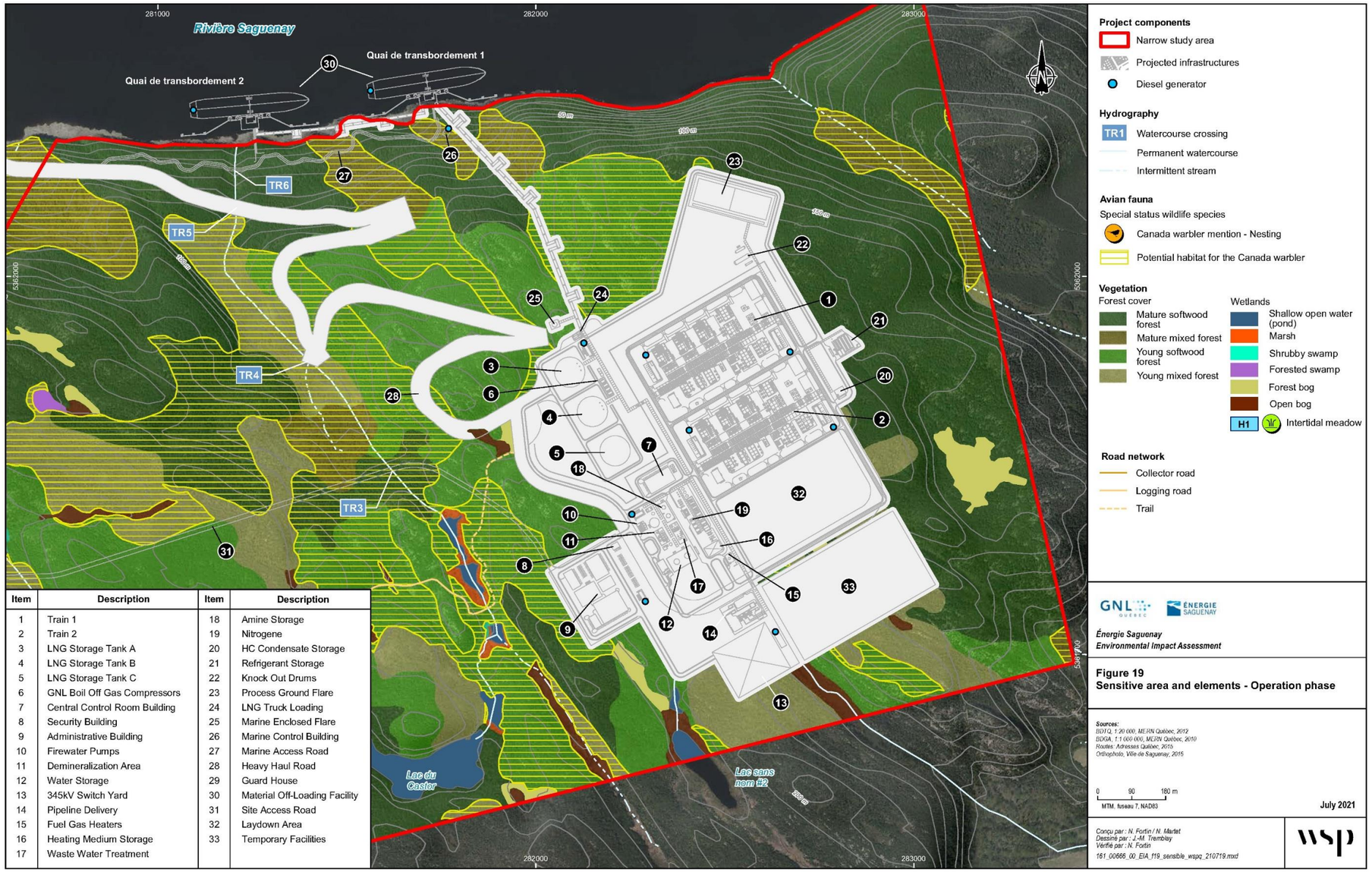
Health Canada is of the opinion that the sensitive elements of the human environment in the extended study area appear to have been adequately considered by the Proponent for the marine component of accidents and malfunctions. Health Canada recommends that the legend of the maps be detailed in order to identify the nature of the receiving element, notably the drinking water intakes and residences, and that this be taken into account in the final emergency measures plan, which would ideally be linked to the municipal plans and those of the marine carriers.

Figure 16: Sensitive zone and elements near the Project - Construction phase



Source: WSP, July 2021

Figure 17: Sensitive zone and elements near the Project - Construction phase



Item	Description	Item	Description
1	Train 1	18	Amine Storage
2	Train 2	19	Nitrogene
3	LNG Storage Tank A	20	HC Condensate Storage
4	LNG Storage Tank B	21	Refrigerant Storage
5	LNG Storage Tank C	22	Knock Out Drums
6	GNL Boil Off Gas Compressors	23	Process Ground Flare
7	Central Control Room Building	24	LNG Truck Loading
8	Security Building	25	Marine Enclosed Flare
9	Administrative Building	26	Marine Control Building
10	Firewater Pumps	27	Marine Access Road
11	Demineralization Area	28	Heavy Haul Road
12	Water Storage	29	Guard House
13	345kV Switch Yard	30	Material Off-Loading Facility
14	Pipeline Delivery	31	Site Access Road
15	Fuel Gas Heaters	32	Laydown Area
16	Heating Medium Storage	33	Temporary Facilities
17	Waste Water Treatment		

Source: WSP, July 2021

Identifying Hazards and Causes of Accidents

The Proponent performed a risk assessment of major technological accidents to determine those that could occur and assess the possibility of their occurrence and their possible consequences for the community and the environment (WSP, January 2019). This assessment also meets the main recommendations of the Risk Management Guide for Major Technological Accidents of the Conseil pour la Réduction des accidents industriels majeurs (CRAIM, June 2017). Also, the Proponent conducted a HAZID (Hazard Identification) study of hazardous materials and the main equipment in order to assess the importance of the hazards and measures to reduce the risks (WSP, January 2019).

Regarding hazards, the Proponent recognized those related to terrestrial and marine infrastructure, the use of hazardous materials and cargo transportation. The main hazardous materials that could be involved in a major technological accident are gaseous natural gas, liquefied natural gas, amine solution, heat transfer oil, refrigerants, propane, mixed refrigerant, diesel, hydraulic, insulating and lubricating oils, and other chemicals. Concerning external hazards of anthropogenic origin, the Proponent mentions the two nearest regional airports at Saguenay-Bagotville[87] and Chicoutimi[88], the port facilities of the Grande-Anse Terminal[89], and the iron concentrate and ferrovanadium processing plant of BlackRock Metals Inc.[90] However, the Proponent indicates that these facilities would be far enough from the liquefaction complex to limit the risk of major technological accidents that could have an impact on the Project's facilities (WSP, January 2019). It should be noted that under an agreement between the Proponent and the company responsible for unloading explosives at the Grande-Anse wharf, constant communication would be established between the two organizations and loading of liquefied natural gas could not be done at the same time as unloading of explosives, and vice versa.

Regarding navigation, the causes of accidents would be related to the physical configuration of the waterway, the marine conditions and the marine traffic. Specifically, the Proponent indicates that the width of the waterway, the tight curves, the shallow depth of certain sectors, the currents, the special conditions, merchant navigation, the ferries between Baie-Sainte-Catherine and Tadoussac, and recreational tourist navigation are risks associated with navigation. The main events that could cause a hazardous product spill would be collisions, groundings, fires, explosions, transshipment or refuelling manoeuvring errors, or equipment breakdowns. Concerning marine shipping, the Proponent began a TERMPOL review[91], i.e., a technical review of the marine terminals and the transshipment sites, conducted in collaboration with Transport Canada. This process reviews ship-to-ship or ship-to-shore cargo handling and also considers the route taken by the tanker in waters under Canadian jurisdiction to its berth. Specifically, it seeks to review the Project's risks for navigation and public safety, particularly by accounting for the technical characteristics of the specialized equipment used. At the end of this review, recommendations would be proposed to the Proponent by Transport Canada regarding protective or safety improvement measures. The analysis is performed in the area bounded by the Les Escoumins pilot station, the Les Razades mooring area, and the marine facilities. The TERMPOL Review Panel members believe that the current regulatory regime and the

[87] Located about 15 kilometres from the Project.
[88] Located about 22 kilometres from the Project.
[89] Located about two kilometres from the Project.
[90] Located about four kilometres from the Project.
[91] TERMPOL is the abbreviation for Technical Review Process of Marine Terminal Systems and Transshipment Sites. This involves a voluntary technical review focused on the safety of the Project's shipping route and the marine terminal.

provisions of international conventions governing marine navigation as a whole would allow for adequate oversight of marine operations related to this Project. The Saguenay Port Authority indicates that additional documentation should be provided as the Project progresses and that the Proponent should commit to implementing the recommendations found in the TERMPOL review. In addition, the Proponent should submit the studies required by the TERMPOL review related to navigation and terminal operations within six months prior to the start of operations.

According to the Proponent, between 1959 and 2010, tankers transported over 33,000 liquefied natural gas cargoes worldwide without a serious accident at sea (WSP, January 2019). There has never been an incident involving a breach in the containment systems that would have triggered cargo leaks, resulting from a collision, a grounding, a fire, an explosion or a hull malfunction. The incidents that occurred resulted in property damage without a cargo leak. The number of tanker trips now stands at over 80,000 worldwide, without loss of cargo. Nonetheless, it is important to mention that potential accidents and malfunctions are associated with risks for which the probabilities of occurrence are never zero, even with the implementation of efficient and rigorously applied management systems (WSP, January 2019).

Potential Effects

The risk assessment conducted by the Proponent addressed the accident scenarios that could have the greatest potential consequences (WSP, January 2020). These factors are presented in Table 17.

The Innu First Nations and the Huron-Wendat Nation expressed concerns about accidental spills and their effects on the ecosystem and its resources. In particular, the Essipiunnuat First Nation raises the issue of a potential accident or spill for migratory bird hunting, marine mammal hunting and fishing activities for subsistence purposes. The PessamiuInutsh First Nation says it is concerned about potential marine incidents that could occur in the Pointe aux Alouettes sector, which has historical and heritage importance for the Innus. The Innu First Nations also raised concerns about the impacts an accident could have on their economic and commercial activities (Section 5.9 – Socioeconomic Conditions), particularly in the Saguenay River and the St. Lawrence Estuary.

The public and environmental groups also raised concerns regarding the safety of riparian residents in case of accidents or malfunctions related to the Project, particularly in case of explosions at the terminal or aboard ships. They also mentioned potential tanker leaks, mainly related to potential gas dispersion. Hydrocarbon spills in case of collision were mentioned, due to the potential effects on the Saguenay River and St. Lawrence River ecosystems, specifically on belugas. The increase in marine shipping and traffic in the Saguenay River concerns some citizens and environmental groups, who indicate that the risk of accidents and spills would increase accordingly.

Transport Canada is of the opinion that the additional number tankers, with the current regime for marine transportation of liquefied natural gas, would not have a significant impact on marine navigation and safety. Transported in liquid state on board vessels specially designed for this product and meeting all international standards and norms, Transport Canada is of the opinion that liquefied natural gas is not dangerous. Nevertheless, in terms of safety, Transport Canada is of the opinion that the Proponent should set up an exclusion zone around the vessel when it navigates upstream from the Escoumins pilot station.

Environment and Climate Change Canada is of the opinion that the analysis of the risks of accidents and malfunctions has been adequately presented by the Proponent and that the environmental effects of potential accidents and malfunctions are sufficiently described for the purposes of the environmental assessment, both for accidents that could occur in the land environment and those that could occur in the marine environment. However, as mentioned by the Proponent, Environment and Climate Change Canada is of the opinion that further analysis will be required once the detailed engineering of the Project is sufficiently advanced, to ensure that accident risks have indeed been adequately identified. Although the Proponent has only used a diesel spill scenario in its modelling to represent what would happen in the event of a collision and hull failure of a tanker operating under the Project, Environment and Climate Change Canada believes that the risks of collision with other types of vessels should not be overlooked in the development of its worst-case accident scenarios, as a major oil spill could have effects on both the biological and physical environment as well as the human environment. For example, economic activities for the Innu First Nations of the Pessamiulnutsh and the Essipiunnuat (for example, traditional or commercial food gathering activities) could be affected, as could aquatic birds and special-status species. Thus, the Proponent should consider all potential effects on the biological and physical environment based on accidents and malfunctions that could occur. This is why Environment and Climate Change Canada recommends that the Proponent carry out and includes in its emergency response plan scenarios for all types of hydrocarbons that could be spilled, both in the aquatic and marine environments, paying particular attention to the most sensitive sectors where the consequences would be the most harmful.

The Canadian Coast Guard indicates, for its part, that the information related to its field of expertise presented by the Proponent is adequately described and documented. Accidental spills of petroleum products may occur during the movement of machinery and during maintenance or refuelling.These spills could occur on a one-time basis but would generally only affect small areas at the spill site. To this end, a spill management system will be put in place on the site to quickly and effectively manage spills, which will limit the impact that these spills could have on the quality of surface soils.

Health Canada notes that the Proponent has identified sources of contaminants and, to some extent, their fate in the environment in the event of major accidents in the Saguenay River, but has not assessed the health effects associated with the ingestion of food potentially contaminated by an accidental spill of hydrocarbons or other substances. Health Canada indicates that the absence of toxicological and carcinogenic risk studies in the case of a marine fuel spill does not preclude a discussion of the substances involved, their characteristics and the route of exposure for humans.

Table 17: Summary of the risk assessment conducted by the Proponent presenting the main accident or malfunction scenarios and their effects on the natural and human environments

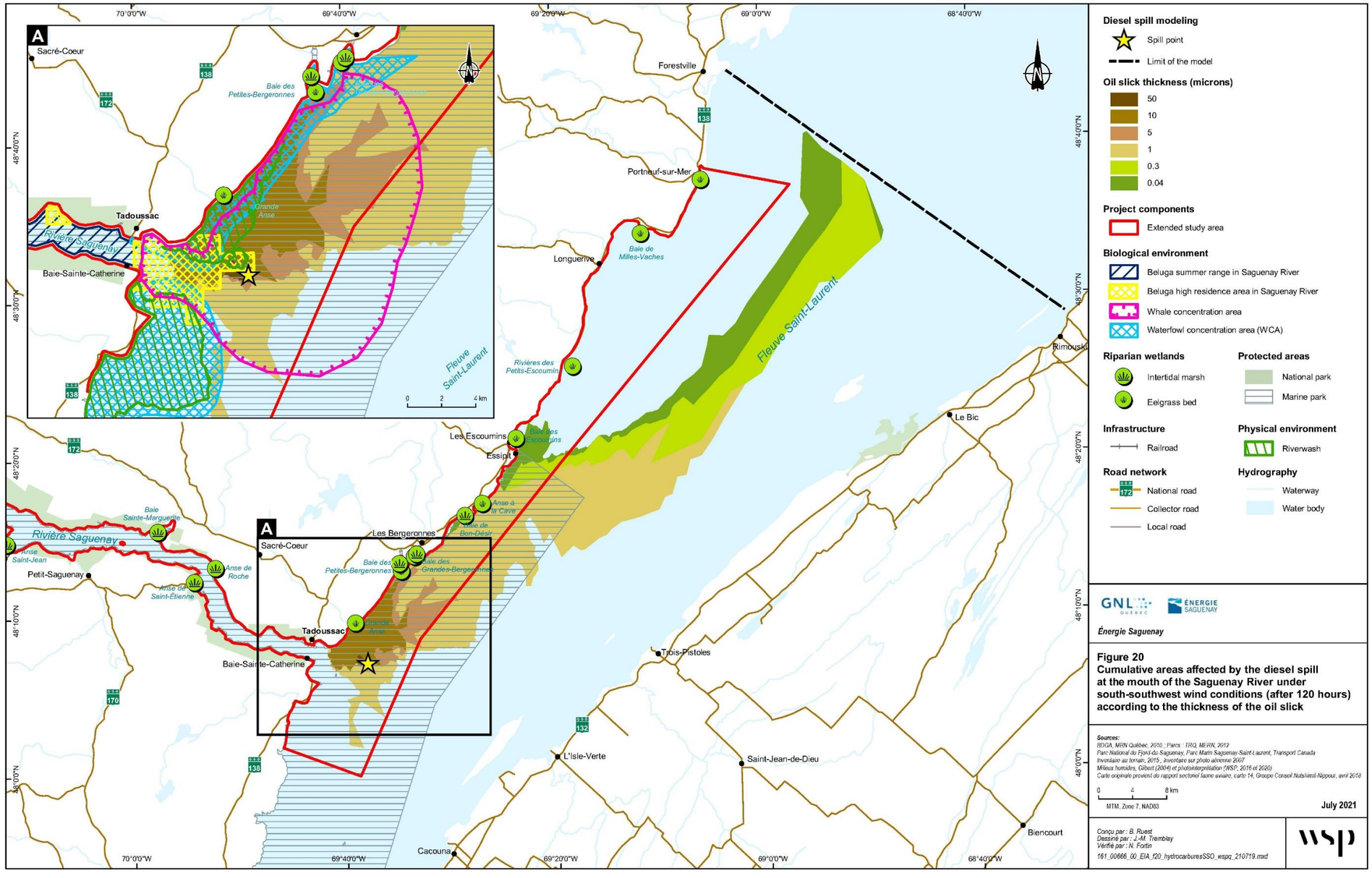
Accident - Malfunction	Source	Description of the effect
Construction work		
Spill of harmful substances (oil, grease, lubricants, paint, cleaning products)	• Accident during transport of petroleum products by truck on the site; • Collision with breach of fuel tank; • Machinery breakdown; • Human error.	• Effect on vegetation: deterioration of foliage, decrease in density, mortality, etc; • Effect on wetlands: contamination of plants, sediments and underlying soils; • Effect on surface water: increase in total suspended solids and transport of petroleum products to a watercourse. Deposition of particles that can have effects on the plant biomass, fish, invertebrates and benthic organisms.
Explosion[92]	• Accident involving a transport vehicle; • Poorly controlled blasting; • Use of compressed gas cylinders for welding activities.	• Effect on human health (depending on the location of the explosion): serious injuries or losses of human lives; • Effect on vegetation: destruction by heat, by the blast wave and the projection effect; • Effect on wildlife: injuries, individual mortality, decrease in availability of feeding and shelter areas; • Effect on surface water: inflow of debris and contaminants into the water.
Forest fires	• Human activity; • Natural cause.	• Effect on vegetation: mortality, disturbances of forest growth, and more or less long-term loss of habitats or suitable plant species; • Effect on wildlife: more or less long-term loss of habitats or plant species conducive to the presence of several wildlife species.
Operation of the natural gas liquefaction unit		
Liquefied natural gas spill	• Storage tanks; • Marine Infrastructure; • Liquefied natural gas loading systems.	• General effect: liquefied natural gas vapours produced that may form a gas cloud dispersed by winds. These vapours would be dispersed rapidly if the cloud did not encounter any hot point or ignition source, which would set it on fire; • Effect on human health: bodily injuries; • Effect on surface water: contamination of surface water and the Saguenay River by liquefied natural gas or oil along the loading line.
Flammable gas leak (methane, propane and ethylene)	• Equipment breakdown; • Malfunction; • Human error; • Perforation of a line.	• General effect: the consequences of a gas leak depend on the quantity of gas emitted, the pressure of the leak and the location of the incident. The risk of fire occurs when the concentration of flammable vapours reaches a level between the lower and upper flammability limit in the ambient air, in the presence of an ignition source.
Petroleum product (diesel) spill	• Accident during transport by truck on the site; • Collision with breach of a fuel tank; • Machinery breakdown; • Human error.	• Effect on wetlands and surface water: accumulation in a depression that can reach a wetland or a watercourse.

[92] The Proponent indicates that blasting is scheduled during the construction, but that no explosives will be stored on the site.

Accident - Malfunction	Source	Description of the effect
Fire and explosion	• Petroleum product spill; • Flammable gas leak; • Hydraulic and lubricating oil leak; • Welding on heating equipment or devices; • Flare.	• Effect on human health (depending on the location): serious injuries or losses of human lives; • Effect on vegetation: destruction by heat, by the blast wave and the projection effect; • Effect on wildlife: injuries or individual mortality.
Chemical spill	• Transportation; • Use; • Handling; • Storage; • Equipment breakdown; • Human error.	• Effect on wetlands and surface water: accumulation in a depression that can reach a wetland or a watercourse.
Navigation		
Hydrocarbon cargo (liquefied natural gas) spill	The Project would attract an annual influx of 150 to 200 tankers, which can reach a maximum capacity of 217,000 cubic metres of liquefied natural gas. The worst accident scenarios, or the worst cases, of liquefied natural gas spills, would be: • In the sensitive sectors of the downstream section of the Saguenay, or at its mouth; • During mooring or transshipment manoeuvres, including loading arm failure.	• General effect: liquefied natural gas is insoluble in water, non-toxic and would remain on the surface. Liquefied natural gas would evaporate in the atmosphere, gradually resuming its gaseous form. Natural gas is flammable in the presence of an active ignition source and a pool fire thus would be possible. Natural gas does not exhibit any explosion risk in open environments; an explosion is possible only in a contained environment. The main effect is associated with thermal radiation around the pool in the event it catches fire. Potentially it could destroy part of the riparian vegetation and cause a forest fire; • Effect on surface water quality: a continuous spill could freeze the surface of the water and cause mortality or severe frostbite in the exposed biota. The risks for marine mammals would be low because the apprehended effects would be temporary spot effects and would mainly be limited to the air-water interface where a lowering of the temperature could be observed; • Effect on air quality: The emission of 25 tonnes of CO_2 equivalent per tonne of methane spilled could have an indirect impact on air quality. However, the amount emitted would be small compared to the global greenhouse gas emissions generated by the Project.
Bunker hydrocarbon (fuel oil) spill	The worst accident scenarios, or the worst cases, of fuel spills, would be: • In the sensitive sectors of the downstream section of the Saguenay, or at its mouth. A 90-degree collision involving a big ship at high speed could cause a breach of the hull. A major accident could involve a maximum fuel volume of around 7,500 cubic metres. The study presented by the Proponent indicates that the only location in the study area where this type of event would be credible would be at in the mouth of the Saguenay (Figures 18 and 19); • During mooring or transshipment manoeuvres.	• Effect on human health: risk for public health and safety, particularly for vulnerable populations. All the inhabited areas along the Saguenay River show a certain vulnerability to such an accident; • Effect on fauna and flora: long-term effects on certain types of habitats, which could cause large-scale contamination of the marine environment, particularly affecting wildlife and plant organisms that use this environment. Contamination of coastal habitats would have effects on vegetation and wildlife species that use these environments for reproduction, food or shelter; • Effect on aquatic wildlife: the presence of hydrocarbons in the water and sediments could cause physical, physiological and behavioural effects on marine wildlife. A decrease in biodiversity, abundance and reproductive success for several invertebrate and fish species could be observed. The occurrence of a spill in the essential beluga habitat, in shallow water, could have severe impacts, because these

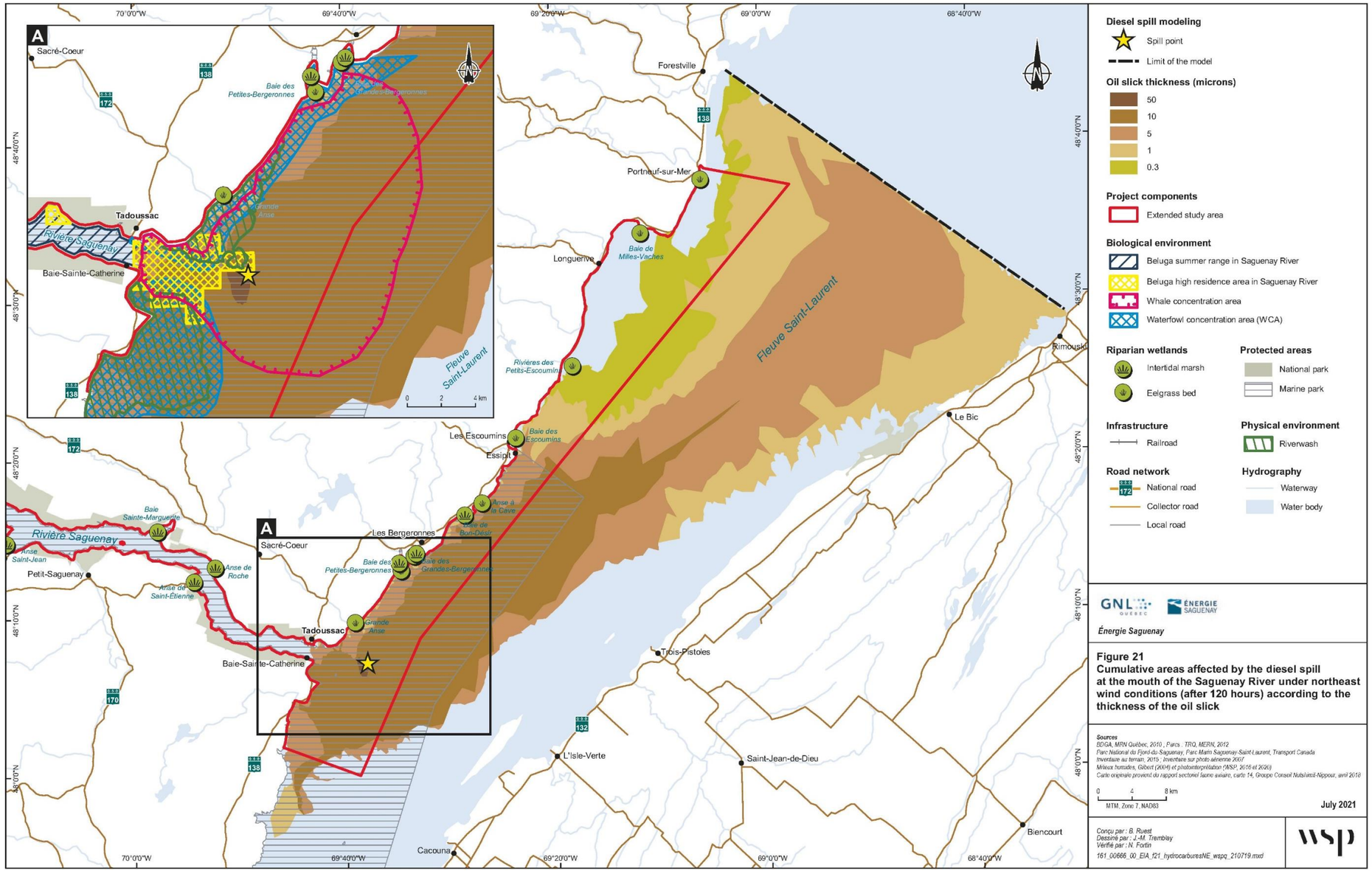
Accident - Malfunction	Source	Description of the effect
		are the habitats most often frequented by females and their young, who are less mobile and agile. Contamination was identified in the restoration plan as being on threat to species restoration; • Effect on birds: the waterfowl concentration areas, including Barrow's Goldeneye, are particularly sensitive sectors and are at risk of large-scale hydrocarbon contamination. Some areas constitute habitats of interest for special status species; • Effect on heritage: effects on the integrity and biodiversity of the Saguenay-St. Lawrence Marine Park or Baie Sainte-Marguerite; • Socioeconomic effect: effects on the recreational tourist clientele. Economic losses for the First Nations could also be apprehended resulting from the reduction of whale-watching cruises and green urchin fishing.
Explosion or fire on board	• The worst-case scenario that could occur on board the ship without interaction with the outside world would be a gas leak in the engine room supplied with liquefied natural gas; • A fire could start as a result of a leak or even in the case of a galley fire, for example, and could spread.	• Effect on human health: risk of injury or fatality among crew members; • Effect on the environment: risk of fuel spillage as well as spillage of response products such as foam or powder during firefighting.
Spill of other harmful or potentially hazardous substances (liquid tar, coal, calcium fluoride and caustic soda).	• Collision between a liquefied natural gas tanker and a ship transporting deleterious or potentially hazardous substances.	• Effect on aquatic wildlife: release of contaminants harmful to aquatic life over time, particularly burrowing organisms and other species that feed on them, including groundfish; • Effect on marine mammals: contamination mainly of the environment and prey. Caustic soda is potentially the most deleterious substance due to its corrosiveness and its reactivity with many other substances, including organic matter; • Effect on birds: mortality of birds or the most exposed organisms; • Socioeconomic effect: disruption of recreational tourism activities.
Spill of other products transported on the Saguenay (apatite or inert cargo).	• Collision with a tanker transporting liquefied natural gas.	• Effect related to inert cargo: spot physical alteration of the habitat. Depending on the volume spilled and the form, the spill could cause fatalities due to burial of organisms; • Effect related to apatite: its toxicity for organisms at the secondary and tertiary trophic levels is unknown. There would be few effects on the productivity of organisms, because it has low solubility and its assimilation by the organisms is slow.

Figure 18: Location of the areas affected by a diesel spill at the mouth of the Saguenay under south-southwest wind conditions (after 120 hours) depending on the thickness of the floating hydrocarbons.



Source: WSP, July 2021

Figure 19: Location of the areas affected by a diesel spill at the mouth of the Saguenay under northeast wind conditions (after 120 hours) depending on the thickness of the floating hydrocarbons.



Source: WSP, July 2021

Mitigation and Follow-up Measures Planned by the Proponent

Different initiatives were proposed by the Proponent to prevent the accidents or malfunctions enumerated above and reduce their environmental risks. In particular, the liquefaction unit will be built in compliance with the requirements of CSA Z276-18 Liquefied natural gas (LNG) - Production, storage, and handling. The Proponent also proposes mitigation, prevention and control measures and a risk management program, including an emergency response plan for its port operations. This would serve as a management tool for emergencies that could arise. Should the Proponent wish to install navigational aids in the Saguenay Port Authority's area of responsibility, the Canadian Coast Guard recommends that he refer to the *Private Buoy Regulations*.

Regarding marine shipping, transport of hydrocarbons is governed by international standards and by federal structures. In particular, the Proponent indicates the *Canada Marine Act*, the *Pilotage Act*, the *Canada Shipping Act*, the Marine Transportation Security Regulations, the Marine Activities in the Saguenay-St. Lawrence Marine Park Regulations, and the TERMPOL processes conducted in collaboration with Transport Canada. Under the *Canada Shipping Act*, the ship has the obligation to have an effective agreement with Eastern Canada Response Corporation (ECRC-SIMEC), which is a Response Organization certified by Transport Canada – Marine Safety.

The objective of the prevention and control measures is to prevent, detect, control, mitigate and repair any eventual hazard that could occur on the site. For terrestrial and marine infrastructure, these measures particularly include fire protection equipment, an access control system, alarm systems connected to the control station, detectors in the sectors at risk, and tanks. The majority of the measures have the objective of minimizing or eliminating the risks of petroleum spills, hazardous materials or suspended particulate matter. In particular, a retention pond would be developed under the diesel tanks supplying the generators on the site and a peripheral runoff water drainage system would be deployed in the construction phase. General prevention and response measures concerning the use and traffic of machinery on the site will also be provided. Concerning the navigation, the Proponent proposes to deploy practices in order to reduce the risk of consequences after an accident, particularly the double hull, reducing the risks of major hydrocarbon spills from tankers. In addition, the tankers would navigate, whenever possible[93], at a maximum speed of 10 knots between the Project site and Les Escoumins. Navigation would be done by pilots certified by the Laurentian Pilotage Authority. The assistance of a tugboat, which would be stationed permanently near the tanker, would also be provided. Transport Canada mentions that in the Saguenay River, towing reduces the risks of accidents and malfunctions because it adds an additional guarantee of totally safe passage. For its part, the Laurentian Pilotage Authority and the Corporation des pilotes du Bas Saint-Laurent are of the opinion that the Proponent has well anticipated the risks associated with the arrival of tankers and they have no particular concerns in relation to this Project.

The Canadian Coast Guard considers that the Proponent's information regarding the assistance of an icebreaker, when ice conditions would require it, is adequately and sufficiently described and documented. It invites the Proponent to communicate with it when its intentions related to icebreaking services will be defined. In addition, Transport Canada recommends that tankers have an ice strength rating of at least 1A

[93] As long as the conditions allow it in total safety, particularly for safety reasons related to manoeuvrability of vessels.

under the Finnish-Swedish Ice Classes Regulations, which also allows for sufficient propulsive power to handle the ice conditions of the St. Lawrence and Saguenay Rivers.

Concerning the security zones related to maritime transport and port facilities, the Proponent undertook to present the study on the risks related to navigation developed by the firm DNV-GL and to develop mitigation measures and recommendations with Transport Canada and the competent authorities. Thus, the safety zones would be defined in committee. At a minimum, there would be a 200-metre avoidance radius around the loading arms. Based on the safety zones established at the Canaport facilities and on what is done elsewhere in the world, such as in the United States, and under the ISO 28460 standard cited above, Transport Canada mentions that the Proponent should evaluate these zones for its Project, taking into account the geographical location of its facilities and access routes, its risk assessments and marine traffic. In addition, the documents submitted by the Proponent do not currently address grounding and collision incident management operations in Canadian waters, including the study area. The management of exceptional maritime incidents is done according to established procedures involving several departments, organizations, the ship's captain and his organization. The latter are responsible for the implementation of their response plans. Transport Canada recommends that the Proponent develop marine incident management plans including salvage plans.

A risk management program would be established to ensure the safety of the workers, the neighbouring population and the environment. In particular, this would include the adoption of an occupational health and safety policy and an environmental policy, as well as the deployment of an emergence response brigade with modern equipment maintained in working order at all times. An emergency response plan would be developed by the Proponent, similar to the one the Saguenay Port Authority has for the Port of Grande-Anse, but adapted to the special conditions of the Project. In particular, the emergency response plan seeks to provide the Port Authority with the necessary tools to respond rapidly and efficiently during potential emergencies in the territory under its jurisdiction (WSP, January 2019). Its purpose is to:

- Bring together all the necessary information to prevent hazardous situations and respond adequately when such a situation occurs;
- Reduce the risks of accidents that may have harmful consequences for the health and safety of the personnel and the neighbouring population;
- Propose effective means of response to minimize the damage in the event that such an accident occurs despite the preventive measures in place.

The emergency response plan would be updated annually and should account for the changes made to the processes or substances, any new toxicity risk level or any new development of tools and equipment used (WSP, January 2019). The coordination previously established among the Saguenay Port Authority, the community, the organizations concerned and the governments (WSP, January 2019) is an integral part of this plan. Under the *Canada Shipping Act*, well-established federal coordination is put forward after an accidental spill, particularly including Environment and Climate Change Canada, Eastern Canada Response Corporation (ECRC-SIMEC) and the Canadian Coast Guard. The preliminary emergency response plan (WSP, January 2020, Appendix R-149) contains the response procedure in the event of a hazardous material spill, a liquefied natural gas or refrigerant leak, a fire or explosion, or an incident with injuries. The emergency response plan includes communication protocols according to the risk levels and according to the stakeholders. The Proponent indicated that the final emergency response plan would comply with

CAN/CSA-Z731-03 and the Environmental Emergency Regulations. To address the concerns of the Innu First Nations, the Proponent will integrate a protocol specific to these nations which will be determined to their needs, into the emergency response plan.

Environment and Climate Change Canada is of the opinion that the protective measures, response protocols and preliminary emergency measures plans proposed by the Proponent are adequate and sufficient at this stage of the Project. Nevertheless, the emergency measures plan should include the mapping of sensitive elements of the environment, in the terrestrial and river environments, in order to direct the interventions as quickly as possible in the event of an accident or malfunction.According to Environment and Climate Change Canada, this mapping should include all the sensitive elements for all the study areas and not only those of the restricted study area. Periodic updating of the mapping should be planned to take into account any changes in the environment and the status of species. Further analysis would still be required once the detailed engineering of the Project is sufficiently advanced. The recommendations of the TERMPOL review committee should also be considered by the Proponent.

Transport Canada indicates that the emergency measures plan should be developed in its operational version before the facilities are put into operation. In developing the plan, the following aspects should be taken into consideration: spills or fires of cargo on board a ship at dockside and fire on board the ship not associated with the cargo, spills or fires of cargo during loading, and spills or fires of cargo not associated with the loading. In addition, this emergency response plan should be shared with local response authorities and updated periodically. Exercises for the implementation of this plan should be scheduled according to a timetable developed under the Environmental Emergency Regulations. Transport Canada recommends that safety and emergency plans be developed in accordance with industry best practices.

Health Canada believes that scenarios that require the development of specific response plans or emergency procedures should be thoroughly evaluated for inclusion in the final emergency response plan. Notably, the preliminary emergency response plan mentions toxic release scenarios, but does not present a procedure for on-site containment.

6.1.2 Agency Analysis and Conclusions on Residual Effects

In the Agency’s opinion, the Project is unlikely to cause significant adverse environmental effects due to accidents or malfunctions, given the application of the mitigation, prevention and control measures and the risk management program, including the emergency response plan.

Analysis of the Effects

The Agency considers that the Proponent has taken into account the effects, in the terrestrial and marine environments, that accidents or malfunctions could have, by documenting these environmental effects and by providing an adequate emergency response plan. The Proponent has adequately noted the risks inherent in its Project and would implement preventive measures that include the appropriate design of infrastructures, their inspection and their maintenance. The Agency is satisfied with the characterization and assessment of potential accidents and malfunctions related to the Project presented by the Proponent. The Proponent has also taken into account the concerns of the federal authorities regarding the risks associated with its Project and is committed to implement the emergency and response plans in case of accidents.

Determination of Key Mitigation Measures

The Agency has taken into account the mitigation measures proposed by the Proponent and the opinion of the expert government authorities and the First Nations to identify the key mitigation measures required so that the Project does not cause significant adverse environmental effects in case of accidents or malfunctions. The Proponent shall:

General Measures

- Take all reasonable measures to prevent accidents and malfunctions that may result in adverse environmental effects and mitigate any adverse environmental effect from accidents and malfunctions that may occur, including consideration of the Canadian Standards Association's CSA Z276-2018 standard for the production, storage and handling of liquefied natural gas (including with respect to the design of the liquefied natural gas full containment tanks) and any information to which it has access with respect to accidents and malfunctions that have occurred in Canada or abroad in connection with activities similar to those associated with the Project;
- Implement any measures recommended in the final report of the TERMPOL review process for the Project that are intended to prevent the environmental effects of the Project caused by accidents and malfunctions, including measures related to winter navigation and vessel protection in ice conditions on the St. Lawrence and Saguenay Rivers, exclusion zones, vessel traffic management on the Saguenay River, escort towing and personnel training, standby pilotage during loading operations, marine terminal security and the content of the port information book;
- Develop, prior to each phase of the project and in consultation with the First Nations and the appropriate authorities, an accident and malfunction contingency plan applicable to each phase of the Project that takes into account the Canadian Standards Association standard CSA Z731-03 on emergency preparedness and response planning and any information to which it has access on emergency preparedness measures applied in Canada or abroad to activities similar to those associated with the Project. Reference in each plan the applicable established response plans, procedures and organizations, as appropriate, of the relevant authorities. Implement the plan applicable to each phase of the Project during that phase. Each emergency response plan includes:
    - A description of the types of accidents and malfunctions that may cause environmental effects during any phase of the Project, including the following potential accidents or malfunctions:
        - While a tanker is at dock, a spill and/or fire associated with its cargo and/or a fire not associated with its cargo;
        - When a tanker is loading, a spill and/or fire associated with its cargo and/or a fire not associated with its cargo.
    - Mapping of sensitive environmental features and receptors (including drinking water intakes and residences) located in the aquatic and terrestrial environment that could be affected in the event of an accident or malfunction and that must be considered during response to an accident or malfunction. The mapping includes a detailed legend to identify all sensitive features and receptors considered by the Proponent;

- Measures under the responsibility of the Proponent to be implemented by the Proponent in response to each type of accident and malfunction to mitigate any environmental effects caused by the accident or malfunction and protect the environment. These measures include, but are not limited to, warning and notification of external parties, refloating measures in the event of a marine accident, and measures to quickly contain and clean up any area affected by a petroleum or hazardous materials spill;
- The location and availability of equipment to respond to each type of accident and failure;
- The roles and responsibilities (including actions to be taken and equipment to be mobilized) of each competent authority and any person or party (including employees and contractors associated with the Project) mandated to or who may be called upon to respond to an accident or malfunction. Provide detailed response scenarios that specify the actions to be taken by each jurisdiction of authority, person, and party and the time frames (minute by minute) within which each action must be taken.

- Submit the emergency measures identified in its plans to the City of Saguenay to ensure a coordinated response to accidents or malfunctions that may occur during the marine transportation of liquefied natural gas and/or at the land-based or marine facilities of the Project;
- Share emergency response plans with the appropriate authorities. Inform them of the legislative and regulatory requirements for pollution prevention, including the *Canadian Environmental Protection Act*, the Environmental Emergency Regulations, the *Fisheries Act* and t*he Migratory Birds Convention Act, 1994*;
- Post a copy of the emergency response plans in plain view of all employees associated with the Project;
- Provide training to all employees associated with the Project (including employees assigned to the wharf) to prevent accidents and malfunctions (including maintenance and use of equipment and procedures for handling and transporting hazardous materials used on the Project) and all measures included in the emergency response plans to ensure that each employee knows how to respond to an accident or malfunction and can activate the appropriate emergency response. Document employee participation in training;
- Consult, before construction, the Innu First Nations of the Essipiunnuat, the Pessamiulnutsh and the Pekuakamiulnuatsh, the Huron-Wendat Nation and the Wolastoqiyik Wahsipekuk First Nation, as well as the relevant authorities, on the measures to be implemented to prevent accidents and malfunctions;
- Review accident and malfunction contingency plans (including to reflect any changes to processes or substances, equipment upgrades, or changes to toxicity risk) at least annually and maintain them (including mapping) throughout the Project phase applicable to each plan. Submit any updates to the emergency response plans to the Agency and the appropriate authorities involved in its implementation within 30 days of the update;
- Implement immediately the appropriate measures described in the response plan in case of accidents or malfunctions that have the potential to cause adverse environmental effects:
  - Implement the communication plan in relation to accidents and malfunctions;
  - Inform, as soon as possible and in accordance with the communication plan, the Innu First Nations of the Essipiunnuat, the Pessamiulnutsh and the Pekuakamiulnuatsh, the Huron-Wendat Nation, the

Wolastoqiyik Wahsipekuk First Nation, parties potentially affected and the relevant authorities about the accident or malfunction. Notify the Agency in writing not later than 24 hours after the accident or malfunction, specifying:

- The date and time when and location where the accident or malfunction occurred;
- A description of the accident or malfunction;
- The list of any substances potentially released into the environment as a result of the accident or malfunction.

- Inform the 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, in particular:
  - A detailed description of the accident or malfunction and its adverse environmental effects;
  - A description of the measures that were taken by the Proponent to mitigate the adverse environmental effects caused by the accident or malfunction;
  - The point of view of the First Nations or potentially affected parties and advice from relevant authorities received with respect to the accident or malfunction, its adverse environmental effects and the measures taken by the Proponent to mitigate these adverse environmental effects;
  - A description of any residual adverse environmental effect and any modified or additional measure required by the Proponent to mitigate residual adverse environmental effects;
  - The details concerning the implementation of the accident or malfunction response plan.
- Submit a written report to the Agency no later than 90 days after the day on which the accident or malfunction occurred, taking into account the information submitted previously, regarding the changes made to avoid a subsequent occurrence of such an accident or malfunction or the implementation of any modified or additional measure to mitigate and monitor residual adverse environmental effects and to carry out any progressive reclamation. The report includes the additional point of view of the Innu First Nations of the Essipiunnuat, the Pessamiulnutsh and the Pekuakamiulnuatsh, the Huron-Wendat Nation, the Wolastoqiyik Wahsipekuk First Nation and the parties potentially affected, as well as the advice of the additional relevant authorities received by the Proponent;
- Update the communication plan before construction in consultation with the Innu First Nations of the Essipiunnuat, the Pessamiulnutsh and the Pekuakamiulnuatsh, the Huron-Wendat Nation, the Wolastoqiyik Wahsipekuk First Nation and the potentially affected parties. Implement and update the communication plan during every phase of the Project. The communication plan includes, in particular:
  - The types of accidents and malfunctions requiring that the Proponent notify each of the First Nations and potentially affected parties;
  - The manner in which each of the First Nations and the potentially affected parties must be notified by the Proponent of an accident or malfunction and the possibilities for the First Nations and potentially affected parties to provide any assistance following the accident or malfunction;
  - The contact information of the Proponent's representatives with whom the First Nations and the potentially affected parties may communicate and the contact information of the representatives of each of the First Nations and the potentially affected parties the Proponent notifies.

- Participate, at the request of the City of Saguenay and throughout the duration of the Project, in any initiative (including any committee) related to the management of environmental risks to which the Project may contribute.

Measures Specific to the Terrestrial and Marine Infrastructure

- Maintain (including at locations where petroleum products and hazardous materials are stored or handled, where equipment and vehicles are refuelled, and in vehicles) and keep operational at all times, during all phases of the Project, all equipment necessary to respond to accidents or malfunctions (including spill kits containing absorbent materials and leak-proof containers to collect petroleum products and other hazardous residual materials);
- Maintain an operational dockside fire protection system (including the wharf and the liquefaction plant) that meets the technical requirements and risks of the Project and is designed by a qualified person who is an engineer licensed to practise in Quebec;
- Install and maintain an operational detection, warningand emergency shutdown system for gas leaks at the liquefaction plant and liquefied natural gas loading facilities during the operational phase;
- Develop and implement a communication plan prior to the operation phase and in consultation with the Administration portuaire du Saguenay to establish constant communication with the company responsible for unloading explosives on the Grande-Anse wharf and ensure that loading of liquefied natural gas cannot be done at the same time as unloading of explosives;
- Maintain, during all phases of the Project, petroleum product transfer sites, equipment and tanks that comply with the requirements of applicable regulations, standards and codes and good industry practices, including a detection and warning system for petroleum product leak or spill;
- Place any diesel tank located in the limited study area on a concrete slab and install a containment system (wich includes a sump and meets current regulatory standards) under each tank to catch any petroleum products in the event of a spill or leak from the tank;
- Develop and maintain, during all phases of the Project, storage areas dedicated to the storage of hazardous materials and handle any hazardous materials within the Project in a manner that reduces the risk of leakage or spillage, including the use of compliant, leakproof containers;
- Post and maintain accessible at all times Material Safety Data Sheets (MSDS) for each hazardous material stored in the restricted study area or handled on the Project to ensure proper segregation of hazardous materials during storage and prompt identification of the relevant characteristics of each hazardous material to be addressed in the event of a leak or spill of hazardous material(s).

Measures Specific to Marine Shipping

- Complete, prior to construction, an enhanced quantitative maritime risk analysis. In doing so, the proponent shall :
  - Submit the analysis to the Agency, Transport Canada and other relevant authorities prior to construction;

- Develop and implement, in consultation with Transport Canada and other relevant authorities, any additional measures recommended in the analysis to prevent accidents and malfunctions that may result in environmental effects from the Project. These measures include establishing safety zones around the loading arms with a minimum radius of 200 metres, taking into account the following:
  - Existing safety zones established around other marine liquefied natural gas handling facilities in Canada and the U.S. (including Canaport LNG facilities in New Brunswick);
  - The International Organization for Standardization standard ISO 28460 for liquefied natural gas facilities and equipment (land-ship interface and port operations);
  - The geographic location of the Project and the anticipated marine traffic during operation.
- Establish a speed limit of 10 knots for tankers downstream from the area of jurisdiction of the Saguenay Port Authority, as long as it is safe for them;
- Establish an approach manoeuvre and mooring zone, in consultation with the Laurentian Pilotage Authority, so that any ship associated with the Project can approach the wharf at reduced speed, subject to navigation safety;
- Determine a maximum wind speed for mooring and let go, in consultation with the Laurentian Pilotage Authority, which accounts for the sails of the ships associated with the Project, subject to navigation safety, and establishes a corresponding maximum wind speed at which tanker loading and unloading activities must stop.

6.2 Effects of the Environment on the Project

6.2.1 Analysis of Potential Effects and Proposed Mitigation Measures

Pursuant to paragraph 19(1)h) of the *Canadian Environmental Assessment Act* (2012), the environmental assessment must consider the effects that the environment may have on the Project. The environment may cause damage to the Project's land and marine infrastructure and affect the likelihood of an accident or malfunction occurring (section 6.1).

The Proponent assessed several environmental factors that could have an effect on the Project, including geological conditions, hydrodynamic conditions, extreme weather conditions and fire. According to the Proponent, the technical design of the Project was carried out taking into account all the risks identified, namely in the selection of types of equipment, materials and best practices (WSP, January 2019).

Potential Effects

Geological Conditions

The potential geological effects assessed by the Proponent include those associated with the risk of seismic activity, liquefaction of clay soils, gravity movements and landslides.

Eastern Canada is located in a stable continental region of the North American Plate, resulting in relatively low seismic activity (WSP, January 2019). Nevertheless, the study area is part of the most active seismic zone in eastern Canada. According to the seismic zone map produced by Natural Resources Canada, the region is in Zone 3, an area where the probability of an earthquake is greater. The recurrence of very high magnitude earthquakes (magnitude > 6) for the region is estimated to be between 350 and 1,000 years. Historically, seismic activity in the region has remained low, with the exception of a 5.9 magnitude earthquake in 1988, located in the area where the Project would be located. In addition, earthquakes occurring in the Charlevoix-Kamouraska seismic zone could have considerable effects on the land and infrastructure located in the Saguenay region, particularly in relation to the stability of unconsolidated deposits, gravity movements and the liquefaction of clay soils. A site-specific seismic hazard assessment for the Project site was submitted by the Proponent in August 2020 (GNL Québec inc., August 2020).

The Proponent states that the buildings and facilities would be constructed in compliance with the National Building Code of Canada, which sets standards for each seismic zone to ensure that buildings are resistant to seismic surges. The Proponent states that it would rely on the most up-to-date data and recognized seismic hazard analysis methods to provide an acceptable risk assessment. Despite the steep slopes along the Saguenay River, few signs of slope instability are observable at or near the Project site (WSP, January 2019). The absence or thinness of surface deposits on the slopes does not provide the material needed to produce gravity movements. The Proponent indicates that no scree slopes have been observed at the base of the rocky escarpments and that in the clay plain areas, most of the ravines are stable and their slopes are generally colonized by mature vegetation. Also, it should be noted that the rock is outcropping or close to the surface in most of the area where the infrastructure would be located. For marine infrastructure, the geology found in their projected right-of-way zone consists of a sedimentary deposit resting on glacial till and rock. In the event of a landslide, the sediments would potentially be destabilized, but it is highly likely that the till deposit would remain stable (WSP, January 2020). The possibility that marine infrastructure could be affected by a submarine or coastal landslide would be studied during the update of the HAZID procedure, during the feasibility engineering phase.

In general, Natural Resources Canada considers that the Proponent has adequately documented the seismic risks inherent to the Project site and has considered them appropriately in the design of its Project during the construction and operation phases.

Hydrodynamic Conditions

With respect to hydrodynamic conditions, the Proponent indicates that the area is drained by small streams within small watersheds (WSP, January 2019). The Project site is therefore not located in a flood-prone area.

Extreme Climatic Conditions

The overall increase in temperature caused by rising greenhouse gas concentrations is leading to changes in current and future climate conditions at both the regional and local levels. The potential effects of extreme weather conditions assessed by the Proponent include rain or snowstorms, extreme winds, fog, sea-level rise, and ice cover and ice floes (WSP, January 2019). The effects of extreme weather can be direct or indirect. In particular, wind, precipitation, snow and ice can cause overload and thus jeopardize the integrity of buildings or equipment. The Proponent indicates that the design of buildings and equipment would comply with the codes and regulations in force, including the National Building Code of Canada, to withstand overload created by extreme weather conditions. For example, a stormwater retention pond would be developed to store and buffer peak flows in the event of major rainfall events, thus making it possible to manage a 10-year return period flood (WSP, December 2020).

According to the Proponent, compliance with construction standards should be able to address the expected fluctuations in rain or snowstorms. With respect to extreme winds and fog, the risks would mainly concern navigation. These would be mitigated by compliance with navigation rules that would be applied in the Saguenay Port Authority's area of jurisdiction. The assistance of the Laurentian Pilotage Authority and the Corporation of Lower St. Lawrence Pilots for the safe planning of manoeuvres would make it possible to operate in such a way as to prevent risks to safety and the environment. No effects are expected with respect to the rise in sea level in the short or medium term since the transshipment platforms would be anchored to rock and the design of the facilities would take into account variability in water level and ice cover that is greater than the expected long-term variability. With regard to ice cover and floating ice, manoeuvres in the Saguenay would be controlled by pilots and the application of established rules should make it possible to maintain safe conditions.

Fires

The Project is located in an industrial-port zone bordering the Saguenay River where there is a significant wooded area. According to the Proponent, the area is at risk of a potential fire that could threaten the facilities and cause environmental damage. The Proponent, through its environmental management program, would implement fire prevention measures. In addition, the emergency measures plan would contain procedures for responding to a fire threatening the facilities (WSP, January 2019).

Mitigation and Follow-up Measures Planned by the Proponent

The Proponent proposes mitigation or preventive measures to reduce the potential effects of the environment on the Project and any resulting environmental effects. In particular, the proposed measures relate to compliance with the Québec Construction Code, application of the navigation rules of the Saguenay Port Authority and assistance from the Laurentian Pilotage Authority and the Corporation of Lower St. Lawrence Pilots. In addition, the Proponent undertakes to establish environmental management procedures and alert measures in the event of an extreme event, such as a storm or fire. In the event of an exceptional event, should an environmental effect cause damage to infrastructure, a follow-up would be implemented until the situation returns to normal (WSP, January 2019).

Natural Resources Canada is satisfied with the measures proposed by the Proponent to reduce the impact of seismic risks on the Project and is of the opinion that the seismic hazard has been properly taken into account. Natural Resources Canada has no comments in relation to the monitoring or follow-up programs and has no additional corrections to recommend.

6.2.2 Agency Analysis and Conclusions on Residual Effects

The Agency considers that the Proponent has taken into account environmental factors that could have an impact on the Project in the design of the infrastructure in land and sea environments, during the construction phase and in day-to-day operations.

7. Impacts on Aboriginal and Treaty Rights

The Agency has assessed the potential impacts on the rights of Indigenous peoples and their severity by reviewing the relations between the Project's activities and the conditions necessary to exercise rights. The availability and quality of resources, access to the territory or the experience related to the exercise of rights and cultural transmission are ways a project is likely to have a prejudicial impact on Aboriginal rights. In the context of the Project, the marine shipping generated by the Project is the main activity likely to cause negative impacts on the rights of the First Nations consulted. The Agency also determined that the Project is part of a regional context in which many projects, both in progress and scheduled, could cumulatively affect the exercise of Aboriginal rights.

At the end of its analysis, the Agency concludes that the Project is likely to cause prejudicial impacts of moderate to high severity on the Aboriginal and treaty rights of the Innu First Nations of the Pekuakamiulnuatsh, the Essipiunnuat and the Pessamiulnutsh in relation to the place occupied by the study area for the practice of their customary activities and the significant cumulative direct effects on the beluga, a species of great cultural significance for these First Nations. The potential impacts on the rights of the Huron-Wendat Nation would be of moderate severity and primarily related to the Project's impacts on their customary activities. Concerning the Wolastoqiyik Wahsipekuk First Nation, the Agency has not received information concerning the exercise of rights by its members in the study area.

The methodology used for the assessment is the one presented in the Practitioner's Guide to Federal Impact Assessments[94]. The assessment is also based on the conclusions of other sections of the report, particularly those pertaining to the common use of land and resources for traditional purposes, fish and fish habitat, birds, accidents and malfunctions, cultural heritage, belugas and other marine mammals, and socioeconomic conditions. The First Nations consulted also provided precious information on their activities, history and issues, their rights and interests that could be affected by the Project and shared their knowledge of the environment and the territory considered.

This assessment must not be used outside the context in which it was developed, namely the environmental assessment of the Project. The information held by the First Nations on their occupancy and use of the territory and resources are bound to evolve, like the exercise of their rights.

[94] Policy Context: Assessment of Potential Impacts on the Rights of Indigenous Peoples: https://www.canada.ca/en/impact-assessment-agency/services/policy-guidance/practitioners-guide-impact-assessment-act/assessment-potential-impacts-rights-indigenous-peoples.html.

7.1 Aboriginal and Treaty Rights

In the course of its assessment, the Agency recognized overlaps between the land claims and affirmations of certain First Nations in the Project's study area. Because this analysis is not a right-determination process, the Agency accounts in this chapter for information shared by the First Nations, in complete respect for their respective positions.

The limits of the traditional lands of the First Nations concerned by the Project are represented in Figure 11 of Section 5.7 – Current use of lands and resources for traditional purposes of this report. The information concerning the historical and contemporary occupancy and use of the study area by these First Nations, including the activities practised for traditional purposes and the resources harvested, are presented in this same section.

7.1.1 The Innu First Nations

As mentioned in Section 5.7, the site of the projected industrial complex is found on the Nitassinan common to the three Innu First Nations of the Essipiunnuat, the Pessamiulnutsh and the Pekuakamiulnuatsh, also called the "Southwest Part" (Figure 11), on which they affirm they jointly hold Aboriginal rights and an Aboriginal title. The portion of the St. Lawrence Estuary east of the mouth of the Saguenay River up to the Les Escoumins pilot station is located more directly in the exclusive Nitassinan of the Essipiunnuat, like the northeast shores of the Saguenay River. The potential effects of the Project could also concern the Nitassinan of the Pekuakamiulnuatsh, which covers half of the Saguenay River, towards the Project site. The Project study area does not concern the Nitassinan of the Pessamiulnutsh. However, the ships that would go to or from the complex would continue their route in the Estuary to the Atlantic Ocean and thus would cross into the marine portion of the Nitassinan of the First Nation.

The three First Nations are signatories, since 2004, of an agreement[95] with the Government of Canada and the Government of Quebec in the context of a comprehensive land claims process that should lead to a treaty. This will describe the effects and conditions of exercising the Aboriginal rights of the Innu First Nations, including their title and their right to government autonomy, over their respective Aboriginal territories and the southwest part. The Innu First Nation of the Pessamiulnutsh withdrew from the negotiations but maintains its claim to the common Nitassinan.

The Innu First Nations indicated that their territories constituted the foundations of their identities and cultures and that the cultural transmission process was carried out from generation to generation through the territory. In the context of exchanges with the Agency, they determined, also based on the United Nations Declaration on the Rights of Indigenous Peoples, which the following rights and interests could be affected by the natural resource development projects, such as the Énergie Saguenay Project: the right to practise traditional activities (hunting, fishing, trapping, gathering, etc.), the right to promote and teach the culture and traditions, values and spirituality, the right to strengthen the ties with the traditional territory, the right to governance

[95] APGN: Agreement signed between Regroupement Petapan and the federal and provincial governments in 2004 laying the foundations for the negotiation of a future treaty: https://www.rcaanc-cirnac.gc.ca/eng/1100100031951/1539797054964

and maintenance of a relationship with the resources, the rights and interests in economic development and, finally, the right to conserve and protect their heritage.

7.1.2 The Huron-Wendat Nation

The region concerned by the Project is located on the eastern edge of and partially within the main customary territory claimed by the Huron-Wendat Nation, the "Nionwentïo," which means "our magnificent territory" in the Huron-Wendat language (see Figure 11, Section 5.7). The Huron-Wendat Nation Council presented various information concerning the special significance of the Saguenay River for the Nation. It thus shared several historical sources referring to this limit of the Wendat territory.

On January 16, 2019, the Huron-Wendat Nation and the Government of Canada signed a protocol on consultation and accommodation. This protocol specifies the process to be followed with the Huron-Wendat Nation when the Government of Canada conducts consultations concerning prejudicial effects on Aboriginal or treaty rights to the Nionwentsïo.

The Huron-Wendat Nation holds rights arising from Huron-British Treaty of 1760, the existence and validity of which were confirmed in 1990 by the Supreme Court of Canada in Sioui Decision[96]. The Côté decision confirms that the Treaty cements the treaty partner relationship between the Huron-Wendat Nation and the Crown, and confirms the territorial application of the rights guaranteed by the Treaty "that had been part of the territory frequented by them at that time."

According to the Huron-Wendat Nation, the Treaty protects, but is not limited to, the customary right, including the right to harvest resources, the right to religion, the right to trade and the right to sovereignty and self-determination. The Huron-Wendat Nation Council assessed the Project's potential impacts on these rights, which it considers as the four pillars of the Huron-British Treaty. Like the Innu First Nations, the Huron-Wendat Nation also recalled the heritage significance of the territory as the basis of Wendat identity and culture. The connection maintained with the territory is fundamental to ensure the maintenance of Huron-Wendat customs and traditions and their transmission to future generations.

7.1.3 The Wolastoqiyik Wahsipekuk First Nation

The Wolastokuk, the Aboriginal territory claimed by the Wolastoqiyik Wahsipekuk First Nation, extends to the northern shores of the St. Lawrence and part of the shores of the Saguenay River. The expanded study area of the Project thus overlaps the marine portion of the First Nation's territory.

In its comprehensive land claim filed in 2006, the First Nation claims Aboriginal rights, including the Aboriginal title to the lands and waters, in order to exercise use of the lands, shores, islands, inland waters, air, underground material and resources within the territories occupied and used by its ancestors. On March 5, 2019, the First Nation and the Government of Canada signed a Framework Agreement[97] in

[96] Sioui judgment: https://scc-csc.lexum.com/scc-csc/scc-csc/en/item/608/index.do
[97] https://www.canada.ca/en/crown-indigenous-relations-northern-affairs/news/2019/03/canada-and-the-maliseet-of-viger-first-nation-embark-on-the-journey-to-reconciliation-conclusion-of-framework-agreement-to-renew-the-nation-to-nati.html

view of the renewal of their relationship. Pursuant to this Framework Agreement, the First Nation and Canada have discussions on subjects of mutual interest, such as fisheries, sites of interest and the Maliseet heritage, and work in partnership with the common goal of favouring the implementation of the Maliseets' right to self-determination and government autonomy.

The First Nation indicated in its exchanges with the Agency that it does not have information on the exercise of rights by its members in the part of its territory overlapping the Project study area. Consequently, it agreed with the Agency not to conclude on the scope of potential impacts of the Project on its rights and uses. However, it shared certain issues related to the potential impacts of the Project on its commercial fishing activities practised in the Estuary and the Gulf of St. Lawrence.

7.2 Potential Impacts of the Project on Aboriginal and Treaty Rights

7.2.1 First Nations Vision

The Innu First Nations and the Huron-Wendat Nation raise several concerns regarding the possibility that the Project will alter the conditions of exercise of their rights, affecting the following values and subjects of significance:

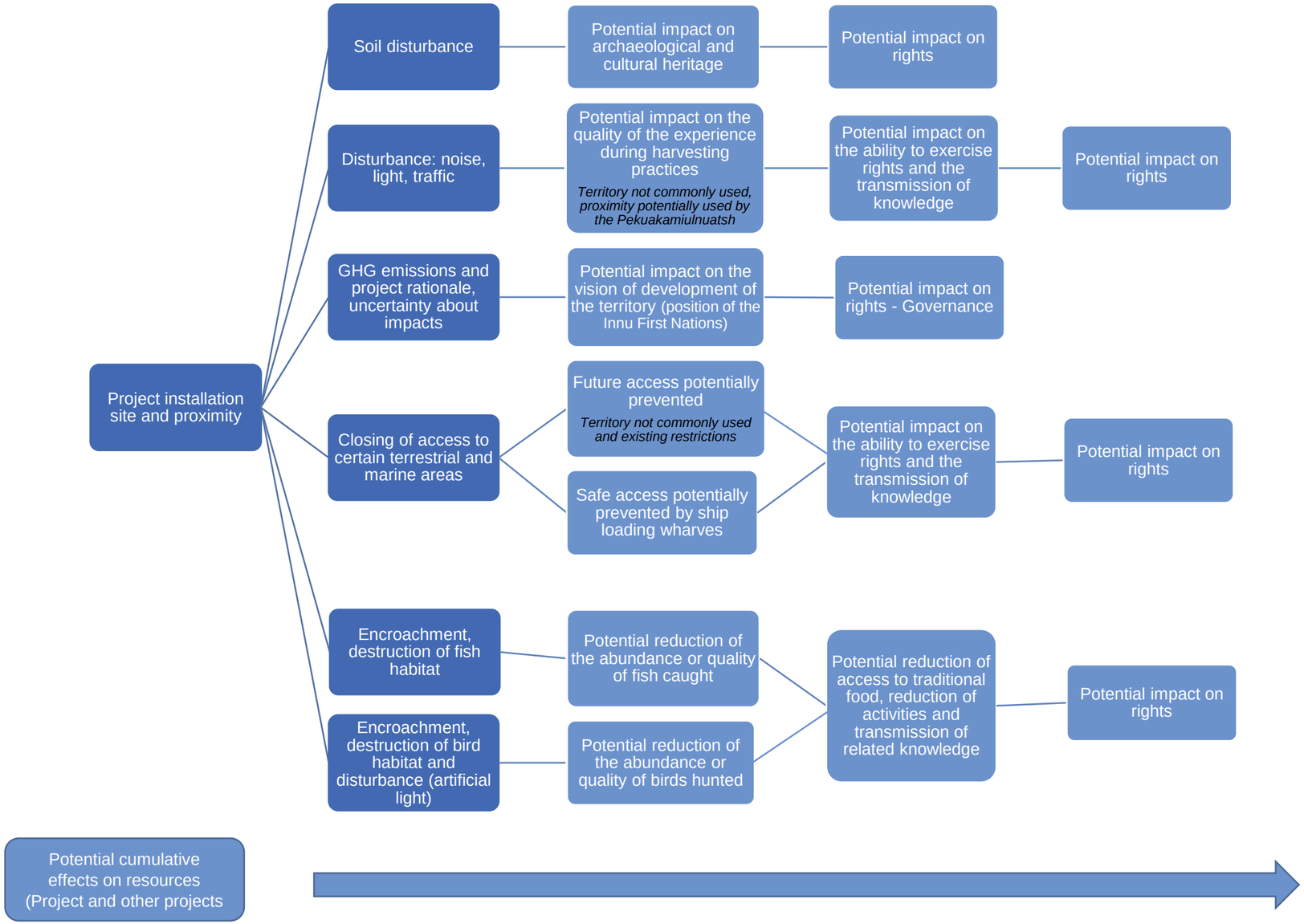
- The health of the environment, both in the implementation area of the Project's terrestrial infrastructure and in the marine environment, including the interactions between the different components of the ecosystems;
- The species of cultural significance, such as the beluga for the Innu First Nations or the American eel for the Huron-Wendat Nation;
- The continuity and conditions of practice of traditional activities;
- Protection of the physical and cultural heritage, including the archaeological heritage;
- Stewardship of the territory, including the economic rights and interests in the study area and potential impacts outside the study area.

The First Nations targeted the marine shipping generated by the Project, and by other projects in the sector, as the main source of potential impacts on their rights and interests. In addition to marine shipping, they also mentioned their concerns related to the broader cumulative effects of the various projects along the Saguenay Fjord and upstream in the St. Lawrence River.

The Innu First Nations publicly announced their unfavourable opinion of the Project on May 12, 2021[98], concluding the absence of social acceptability due to the uncertainties persisting regarding the Project's effects on marine mammals, particularly on the beluga whale, and its real contribution to the reduction of greenhouse gas emissions in a context of climate change.

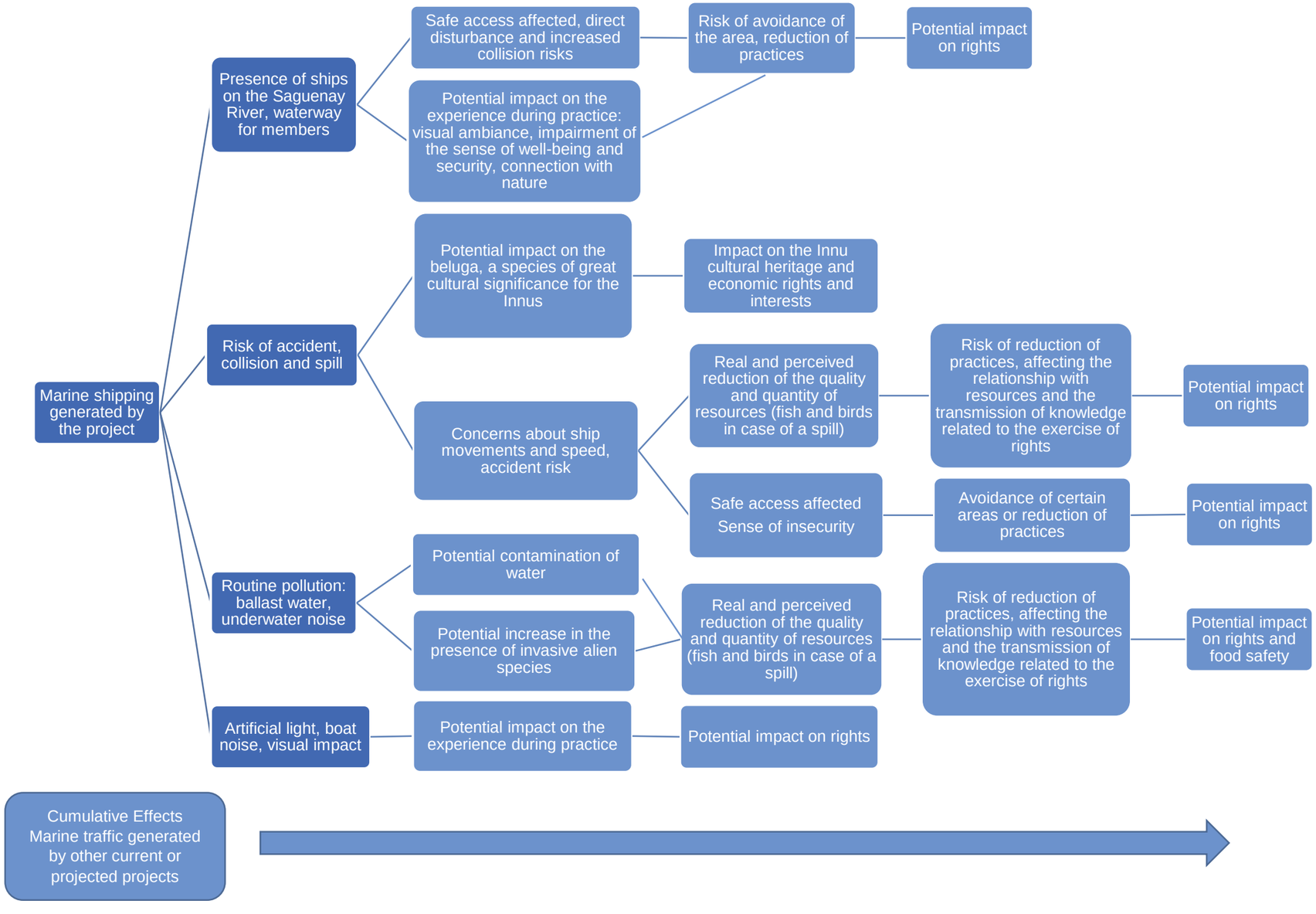
[98] The Councils of the Innu First Nations of Essipit, Mashteuiatsh and Pessamit henceforth now oppose the Énergie Saguenay and Gazoduq projects.

Figure 20: Visualization of the Potential Impact Pathways – Project Implementation Sites



Source: Agency, 2021

Figure 21: Visualization Project's Potential impacts Channels on Rights – Marine Shipping



Source: Agency, 2021

Hunting, Fishing, Trapping and Gathering

The paragraphs below deal with subsistence hunting and fishing. The same activities practised for economic purposes are addressed below.

Project Implementation Site

The First Nations did not indicate concerns in relation to a potential disturbance during the exercise of the resource harvesting rights on the Project site, because they do not commonly practice hunting, fishing, trapping or gathering.

Although various information was provided on their historical presence in this sector (Transfert environnement et société, April 2018), the Innu First Nations indicated that this did not show favourable conditions for the practice of traditional activities, due to its industrial character and its proximity to municipalized territories. However, they recalled that the Project site was located on their common Nitassinan and that, regardless of the use of this sector, this inherently represented an impact on their rights. In the same vein, for the Huron-Wendat Nation, even in the absence of contemporary use of the site, the implementation of a new plant in this sector could prevent any possibility of future use by the members of the Nation and thereby would have a cumulative effect on their rights.

In terms of resources, the First Nations are concerned about the “domino” effect, particularly on the exercise of their resource harvesting rights, even off-site, potentially resulting from any effect on the environment in this area. Both the Innu First Nations and the Huron-Wendat Nation addressed in their analysis the potential direct and indirect effects of the Project on species at risk, birds, fish, terrestrial and marine vegetation, etc. Some of these components, such as fish and birds, directly support the exercise of Aboriginal rights, such as fishing or hunting. Other components contribute more indirectly to the maintenance of favourable conditions for the exercise of rights or represent key indicators of the territory’s health, which itself is a condition for the pursuit of customary activities. For the Huron-Wendat Nation, any effect on a species included in its territory constitutes an impact on its rights whether this species is currently exploited or not.

Because the terrestrial part does not overlap the Wolastokuk, the Wolastoqiyik Wahsipekuk First Nation did not share concerns regarding the potential impacts of the Project on its rights in this sector.

Saguenay River and St. Lawrence Estuary

As indicated in Section 5.7, the Saguenay River and its shores are frequented more particularly by the Essipiunnuat, who practise their traditional activities there year-round, particularly at the mouth. The Essipiunnuat also practise their fishing and hunting activities, including seal hunting, in the sector of the study area corresponding to the Estuary. Like the Pekuakamiulnuatsh First Nation, it did not provide formal documentation of the use of the territory by its members, but indicated that they probably would frequent the river. The Pessamiulnutsh would practise their subsistence activities in the sector of the Estuary and its shoreline. The Huron-Wendat Nation Council conducted a field survey in the context of this Project and also identified several members who practised fishing, boating and hunting of migratory birds in the Saguenay River sector, primarily in the summer.

The main fear of the First Nations in this sector concerns the potential effects of marine shipping on fish and other marine resources. According to them, the marine shipping generated by the Project, from the mouth of the Saguenay River to Les Escoumins, could have negative impacts on the customary right to harvest resources, including the right to fish. Moreover, it could have negative impacts on the right to hunt migratory birds or seals, particularly in case of a major spill. For the Innu First Nations whose territories are alongside the waterways used by the ships that will serve the Proponent's facilities during the different phases of the Project, the risk of accidents remains an effect that is a major source of concern. Apart from the direct risk to the environment and resources, the Huron-Wendat Nation also raised the issue that the accident risks perceived by the users and reduced quality of resources could cause anxiety and have an effect on their frequenting the territory.

The routine pollution related to marine traffic, apart from accident risks, also worries the First Nations. The Innu First Nations thus indicated that the increase in marine shipping would be accompanied by an increase in deballasting, leading to water contamination and a risk of introduction of invasive alien species, indirectly affecting the quality and health of the resources harvested and consumed (Pekuakamiulnuatsh Takuhikan, June 2019). The First Nations also targeted anthropogenic underwater noise as another risk for marine biodiversity.

Regarding the users' experience when exercising their rights, the Huron-Wendat Nation indicated that the increase in the number of ships would lead to a risk of direct disturbance of its members navigating on the Saguenay River. According to the Nation, the experience regarding the exercise of a right is equal in importance to the practice itself. The Innu First Nations raised the same issue, also questioning the way the users might be apprehensive not only about the increase in the number of ships, but also their larger size. The impacts on the users' perceptions are difficult to anticipate, according to the Innu First Nations. These perceptions would be related, in particular, according to what was shared by the First Nations, to the sense of safety and well-being, but also to the quality of the visual ambiance, the territory and its integrity. These fears primarily concerned the Saguenay River sector. Indeed, concerning the St. Lawrence Estuary, the survey of the Innu users consulted for the SAURT study[99] (Transfert environnement et société, April 2018) revealed that due to the low risk of encounters and the fact that many ships already circulate there, the increase in marine traffic would not be perceived as a source of impact in this sector.

Finally, the First Nations are also apprehensive about the access problems that could result from the presence of a greater number of ships on the Saguenay River. They fear an increase in the risk of accidents and collisions and a decrease in safe access by their members to their practice sites. The Huron-Wendat Nation thus explains that the decrease in safety on the river could lead to a stoppage or reduction of activities by the users.

[99] Étude sur le savoir autochtone et l'utilisation des ressources et du territoire dans le cadre du projet Énergie Saguenay de GNL Québec (Study of Indigenous knowledge and use of resources and the territory in the context of the Énergie Saguenay Project of GNL Quebec).

The increase in marine traffic during the construction phase, and more specifically, in the operations phase, could have the consequence of reducing access to the Saguenay as a waterway still used by the Huron-Wendat Nation to this day. The increase in marine traffic could compromise safety and thereby the interest of Huron-Wendat users who practise their customary rights there (Council of the Huron-Wendat Nation, 2020).

Boating and Other Recreational Activities

Boating is practised by the Innus and the members of the Huron-Wendat Nation for several purposes, but primarily for fishing and for observation of marine mammals, particularly on the Saguenay River and at its mouth. The impacts described above related to boating while practising customary activities would also be manifested during boating for recreation, observation and contemplation.

The Innu First Nation of the Essipiunnuat also indicated that the increase in marine traffic could lead to a reduction in the quality of the landscape and issues in terms of coexistence of different types of navigation (Conseil de la Première Nation des Innus Essipit, 2019).

Culture and Language

Archaeological, Historical and Cultural Heritage

The Innu First Nations and the Huron-Wendat First Nation raised the historical and heritage significance of the Saguenay Fjord, particularly showing the existence of historical evidence of occupancy of the sector by their ancestors. The Innu First Nations also confer a high historical and cultural value on the Estuary's marine environment.

Concerning the Saguenay River, although it is no longer the important waterway it used to be, the value attached to it by the Innus is linked to the fact that it is inseparable from their history (Transfert environnement et société, April 2018). In the SAURT study, several Innu toponyms thus were identified in the study area. The toponymy and the archaeological sites present show the significance of the sites in the movements and for the subsistence of their First Nations:

> ***Thus, the landscape along the Saguenay and the fjord itself represent a historical record for our First Nations, containing memories, symbols, traces of the past and tangible remnants. It is thus part of both the physical and cultural heritage of the entire Innu nation (Pekuakamiulnuatsh Takuhikan, Council of the Innu First Nation of Essipit and Council of the Innu of Pessamit, 2020).***

Among the sites of cultural interest, the Innu First Nations cited Pointe aux Alouettes, a heritage site where the “Grande Alliance” was made between the Innu Grand Chief Anadabijou and Samuel de Champlain.

The Innu First Nations and the Huron-Wendat Nation also cited archaeology as a fundamental component for their interests in the Project’s region and thus raised the importance of their participation in the archaeological work and the deployment of best practices for the protection and development of any discovery.

Species of Cultural Significance

The beluga whale is another component of the Innu heritage that the First Nations concerned determined to be sensitive and that could be affected by the Project. They shared several concerns and various information regarding the biological and environmental aspects related to this species but also on what it represents for the Innu way of life and culture.

> ***The beluga is part of the cultural heritage of the First Nations of Essipit, Pessamit and Mashteuiatsh. If this species disappears, then a part of our distinctive culture disappears and this is priceless (Pekuakamiulnuatsh Takuhikan, June 2019).***

The Huron-Wendat Nation recalled the cultural significance of the American eel for the Nation, which has developed special expertise related to its management and protection. According to the Huron-Wendat Nation, any impact on the American eel could affect its rights, including the right to trade, given the marketable expertise it has developed on this species. In its exchanges with the Agency, the Nation indicated that, in its opinion, the Proponent had underestimated the presence of the American eel in the study area.

Economic Rights and Interests

For the Innu First Nations, two major economic activities are at the core of the concerns of the members and the socioeconomic stakeholders of their communities in relation with the Project: marine mammal observation tours offered to tourists and the green sea urchin fishery on the shoals of Batture aux Alouettes. The fears of the Innu First Nations concern the contingency of an incident, related to navigation generated by the Project, which could have major consequences for the local economy by affecting the territory and resources on which it is based. Concerning cruise ships, the traffic at the mouth of the Saguenay River could also lead to disturbance of the users and marine mammals for the cruise ships and thus reduce the quality of the experience offered by the companies of the Innu Essipit First Nation.

Like the Innu First Nations, the Wolastoqiyik Wahsipekuk First Nation is concerned about the Project's impact on its commercial fishing activities, particularly green sea urchin and snow crab fishing practised respectively in the immediate vicinity of the mouth of the Saguenay River and in the St. Lawrence Estuary. The First Nation explained to the Agency the significant place occupied by these activities and others that result from them, related to the processing and development of resources, particularly from fishing, in its economy.

First Nations commercial fishing activities are also traditional in nature as they include mechanisms for community sharing.

The Huron-Wendat Nation does not currently carry on economic activities in the Project study area. However, it questions a potential impact on its right to trade, primarily in the context of a more forward-looking vision of its development, on potential future economic activities. The Huron-Wendat Nation Council indicated to the Agency that the Project and the other development projects in the region could thus have both negative and positive impacts on its right to trade, either by preventing future economic opportunities (for example by the Project's effects on marketable resources), or by creating new ones (for example by agreements with the proponents).

Governance

The First Nations all make a direct connection between their economic rights and interests and their governance. Any impacts on these rights and interests could thus affect not only their socioeconomic development, in a context in which there is already an adverse economic gap (Pekuakamiulnuatsh Takuhikan, Innu Essipit First Nation Council and Pessamit Innu Council, October 2020), but also for their stewardship capacity and government autonomy.

The Innu First Nations repeatedly emphasized their good collaboration with the Proponent. However, after the publication of the report of the Bureau d'audiences publiques sur l'environnement in March 2021, the Innu First Nations officially announced that they were unfavourable to the Project and announced that the persistent doubts concerning the potential effects on marine mammals and on climate change would be contrary to their vision of the territory and the welfare of future generations. They subsequently announced the suspension of all negotiations with the Proponent.

Regional, Historical and Cumulative Context

Concerning the regional context, the Innu First Nations mentioned that their territories were considerably reduced and fragmented in consequence of the opening of the territory to colonization, the forest industry and resorts (Pekuakamiulnuatsh Takuhikan, Innu Essipit First Nation Council and Pessamit Innu Council, October 2020).

Like the Huron-Wendat Nation, they also indicated their concern about the future conditions of exercise of rights in a context in which the effects of the Project would be cumulative with those of other projects in the region, particularly the projects likely to cause an increase of marine shipping on the Saguenay River. The Huron-Wendat Nation thus indicated that these projects intensified the pressure on its activities in the St. Lawrence River and its tributaries, while arousing its members' concern for the integrity of their territory.

Apart from the increase in marine traffic generated by these projects and their potential cumulative effects on the marine environment, the Innu First Nations also shared strong fears in relation to the cumulative effects on the terrestrial ecosystems, particularly in relation to the noise and brightness generated by the different projects, whether in the construction or operations phase. They thus indicated that the accumulation of projects in a limited space and time would have effects on all of the trophic chains, the human environment and the biotic environment and that these effects could affect a vaster territory than the one associated with the Project implementation site and its immediate proximity.

7.2.2 The Agency's Analysis

To determine the channels by which the Project would be likely to infringe Aboriginal rights, the Agency studied its potential impacts on the following components:

- The quality and quantity of resources hunted and fished;
- Safe access to the practice sites and use of preferred modes of transport;
- The experience regarding the exercise of rights.

The details of the anticipated effects on several components, particularly the resources hunted and fished by the First Nations, are presented in the sections of the report dedicated to them and in Section 5.7 pertaining to the uses for traditional purposes.

Resources

Marine shipping and the risk of accidents and spills constitute the main source of potential impacts on Aboriginal rights, specifically hunting and fishing rights and economic rights and interests. Regarding the concerns of the First Nations related to the risk of accidents, the Agency considers that the Project is unlikely to result in material adverse environmental effects due to accidents and malfunctions, given the application of mitigation, prevention and control measures and the risk management program, including the emergency preparedness plan. An accident could have major consequences for the food security of the First Nations and their rights, affecting the quantity and quality of the resources harvested. The increase in marine traffic and the potential risk of accidents perceived by the users may also affect the perception of the quality of the resources harvested for subsistence and commercial purposes. Any perception of contamination, or change

in the taste of resources, thus could lead to a reduction in the quality of the experience of exercising rights, and even, for some users, to the abandonment or reduction of activities that finally could affect cultural transmission related to the exercise of rights.

According to Fisheries and Oceans Canada, it is unlikely that normal activities related to the Project, apart from the risk of accidents, could cause significant effects on fish and fish habitat, including the quantity and quality of species fished and gathered by the First Nations. However, Fisheries and Oceans Canada recommended that a follow-up-of the ballast water and the risk of introduction of invasive alien species, an issue raised by the First Nations, be deployed (Section 5.2 - Fish and Fish Habitat). The potential effects on fish and fish habitat, migratory birds and the harp seal are described in the sections dedicated to these components and in the section on common uses for traditional purposes (Section 5.7). These effects would not, in the opinion of Fisheries and Oceans Canada and Environment and Climate Change Canada, be likely to be significant.

However, although considered unimportant, these effects would not be nonexistent and several uncertainties remain concerning them. The Agency also notes that the Project's potential effects on birds and fish, although low or moderate, could affect Aborginal rights cumulatively, by adding to the effects of other projects in progress or projected in the region.

The rights and economic interests of the Innu First Nations could also be affected in relation to the significant effects on the beluga whale (section 5.2 - Marine mammals, including the St. Lawrence beluga whale). The Agency believes that the Project is likely to cause moderate direct and cumulative adverse environmental effects on socioeconomic conditions related to recreation and tourism and marine mammal watching (section 5.9 - Socioeconomic conditions).

Access and Experience

The exercise of rights by the members of the Innu First Nations and the Huron-Wendat Nation could be affected in terms of access and experience due to the increase in marine shipping.

First of all, the presence of additional ships and the Project's marine infrastructure, particularly on the Saguenay River, could reduce access to the river, by increasing the risk of collisions and causing issues of coexistence of the different types of navigation. The traffic generated by the Project could cause difficulties and require additional efforts by the users wishing to access their practice sites. It could also alter their sense of safety on the water. As for the Project's marine infrastructure, the Project site is located near the Port of Saguenay's existing facilities. It is likely that this area under the jurisdiction of the Saguenay Port Authority is already avoided by users and that traffic restrictions already exist. The manoeuvring of tankers is also supervised by the Port Authority.

Similarly, the experience of the members of the Innu First Nations and the Huron-Wendat Nation on the Saguenay River could be altered by the presence of a greater number of bigger ships and boats. The visual footprint of these ships and the users' perception of the risk of accidents could have an influence on the use and pursuit of activities, particularly hunting and fishing. The presence of ships, and the changes to the visual ambiance, may have an impact on the sense of well-being, safety and connection with nature. This could affect the optimum conditions for exercising rights and lead to the abandonment or reduction of practice by

the users, who would no longer perceive the Saguenay River and its shoreline as an environment conducive to exercising rights and cultural transmission.

Concerning the Estuary area, and given the information shared by the First Nations on the conditions of exercising rights in this sector, it is unlikely that the increased presence of ships causes issues in terms of experience or access to the areas where rights are practised. The effect that navigation of bigger ships may have on experiencing the territory and the practice of activities remains difficult to discern, however, because it mainly would result from the users' perception.

These effects on access and experience could be felt cumulatively in a context in which the increase in the number of ships generated by the Project would be combined with the traffic generated by other projects in the region.

Concerning access in the terrestrial environment to the Project implementation site, the Agency notes the absence of culturally significant places and resources on the site and the absence of contemporary use of the site by the First Nations. The presence of the plant could prevent future use of the area if this were desired, but this issue goes beyond the Project and instead would be related to the very existence of the industrial-port area where the Project would be implemented. Although there were no formal indications by the First Nations that these lands could have been used otherwise for the exercise of their rights, currently or in the future, the gradual expansion of this type of area and the general increase in the number of projects in the region may contribute to the feeling of loss of access to the territory.

Physical and Cultural Heritage

The deployment of mitigation measures and the involvement of the First Nations in the archaeological interventions anticipated in case of fulfilment of the Project or in case of a fortuitous discovery would make it possible, according to the Agency, to avoid any negative impact on their archaeological heritage.

Regarding the heritage, the Agency takes note of the special historical and cultural significance the Saguenay Fjord has for the First Nations concerned. Its landscape could be altered, directly and cumulatively, by the presence of a greater number of ships and thus lose its character conducive to the exercise of rights, the connection with nature and with the ancestors for the First Nations. The right to strengthen the connections with the traditional territory, Huron-Wendat territoriality and the right to hunt and fish, as formulated by the Innu First Nations and the Huron-Wendat Nation, thus could be affected by a loss of attraction and a feeling of deterioration of this part of the physical and cultural heritage.

Concerning the species of cultural significance, the Project would have significant direct and cumulative effects on the beluga whale, whereas the species occupies a large place in their way of life and their history and is already listed as an endangered species under the *Species at Risk Act*. The Agency notes the degree of uncertainty regarding the effects of the Project on this species.

Concerning the American eel, which is an important species for the Huron-Wendat Nation, although it is present in the study area, Fisheries and Oceans Canada does not anticipate negative effects from the Project on this species.

7.3 Proposed Mitigation and Accommodation Measures

Certain mitigation and accommodation measures proposed by the Agency in the environmental assessment report would allow mitigation of the effects of the Project, which could have impacts on rights and the practice of traditional activities. These measures concern fish and fish habitat (Section 5.3), migratory birds (Section 5.5), marine mammals, including the St. Lawrence beluga whale (Section 5.2), common use of lands and resources for traditional purposes (Section 5.7), physical and cultural heritage (Section 5.8) and accidents and malfunctions (Section 6.1). However, these measures would not allow total avoidance of the impacts on the Indigenous peoples.

Indeed, because marine shipping is an integral part of the Project, the potential impacts on rights, particularly in terms of access and experience, cannot be totally avoided. Moreover, several impacts related to the users' perceptions of the visual ambiance, their sense of safety or the quality of the environment and the resources, are difficult to anticipate. So is the way these perceptions could affect the essence of rights.

This is why the Agency recommends that the follow-up program for First Nations traditional activities, provided in the key mitigation measures in Section 5.7, accounts for any additional information on the exercise of rights and any new impact on them that could occur during the Project lifecycle. The Agency also considers the involvement of the First Nations in mapping the areas and components sensitive to the risk of accidents as a key measure to mitigate the potential impacts on Aboriginal rights. The Agency recommends that the Proponent commit to an ongoing dialogue with the First Nation and deploy adaptive management of the measures implemented to counter the impacts on Aboriginal rights. For this purpose, the committees that would be set up during the construction phase must involve the Innu First Nations, Huron-Wendat Nation and Wolastoqiyik Wahsipekuk First Nation, according to their interest.

Regarding the concerns of the First Nations about the cumulative effects on the elements of the physical and biological environment in the area where the land-based infrastructure would be installed, Environment and Climate Change Canada has not identified any concerns. However, the Agency asks the Proponent, in order to respond to the First Nations' issues and the knowledge they have shared on this subject, to participate in any regional or Saguenay Port Authority initiative related to the monitoring, assessment or management of cumulative effects that would be put in place during the construction or operation of the Project (section 5.5). The Agency also asks the Proponent to install artificial bat dormitories (section 5.6) and to follow up on them, as well as to assess the contribution of its Project to cumulative effects (section 5.6).

7.4 Other Measures/Complementary Measures

The Innu First Nations deplored the absence of a regional assessment that would have made it possible to determine the reference state, particularly for the Saguenay River, before the arrival of new projects in the sector. The Innu First Nations as well as the Huron-Wendat Nation and the Wolastoqiyik Wahsipekuk First Nation participated in the engagement process conducted by the Agency until April 2021 in the context of the application for a regional assessment filed by the Mohawk Council of Kahnawà:ke and requested an expansion of the scope of this potential assessment to include the Saguenay River. On July 15, 2021, the

Minister of the Environment and Climate Change determined that a regional assessment of the St. Lawrence River region of Quebec will be conducted in accordance with the Impact Assessment Act, following the request of the Mohawk Council of Kahnawà:ke. The area to be assessed has not yet been determined. As part of the upcoming planning process, the Agency will collaborate with the Province of Quebec, Aboriginal peoples, other governmental and non-governmental organizations in the design of the regional assessment, which will include the definition of the area to be assessed.

Concerning the cumulative effects of marine shipping, which were raised as a major concern of the First Nations, the Agency notes the existence of Transport Canada's cumulative effects of marine activities initiative, developed under the Oceans Protection Plan and the St. Lawrence Action Plan. The scope of the study was expanded to include an Indigenous sociocultural component. If the Project is given the go-ahead, the results of this study would make it possible to have potential tools for the assessment and management of the cumulative effects of marine activities.

7.5 The Agency's Conclusion Regarding the Potential Impacts on Aboriginal Rights – Severity of Impacts

Based on the analysis of the Project's environmental effects on the Indigenous communities, including the direct and indirect effects on the common uses for traditional purposes (Section 5.7) and on cultural heritage (Section 5.8), related mitigation measures described in Sections 5.2, 5.3, 5.5, 5.8, 5.9 et 6.1, potential impacts and the main mitigation, monitoring and follow-up measures described in Appendix C, the Agency concludes that the severity of the Project's potential impacts on Aboriginal rights would be:

- Of moderate to high severity for the Innu First Nations;
- Of moderate severity for the Huron-Wendat Nation.

The Agency also considers that the impacts the Aboriginal rights related to the effects of marine shipping in terms of resources, access and experience would be accumulated with the effects of marine shipping generated by other projects in progress and anticipated in the region (Blackrock Metals, Ariane Phosphate and the North Shore Terminal). The details of this cumulative context that could affect First Nations activities are presented in Section 5.7.

7.5.1 Innu First Nations

The Agency considers that the Project could cause impacts of moderate to high severity on the rights of the Innu First Nations, particularly on the Innu First Nations of the Pekuakamiulnuatsh and the Essipiunnuat.

- **Probability:** A high probability exists that one or more impacts will occur on the rights of the Innu First Nations, particularly on the right to fish, economic rights and interests, and the right to conserve and protect their heritage in relation to the expected effects on the beluga whale. The right to promote and teach culture and traditions, values and spirituality could also be affected indirectly. The right to

strengthen the connections with the traditional territory, the right to governance and to a relationship with the resources could also be impacted to a lesser extent. The rights and interests in economic development could be affected in case of accidents. However, the Agency considers that the risks were correctly assessed by the Proponent and that, by the deployment of mitigation measures, the Project is unlikely to result in material adverse environmental impacts due to accidents or malfunctions.

- **Scope:** The severity of the impact levels in terms of the extent of potential impacts on the rights of the Innu First Nation of the Essipiunnuat would be high, because they would occur over a larger spatial extent related to the exercise of rights for this First Nation. The severity would be low for the other two First Nations, for which the impacts would not occur in preferred or exclusive places of use.
- **Frequency, Duration and Reversibility:** The Project would lead to long-term effects for the entire duration of operations, on an intermittent basis with the almost daily passage of ships. The Project's potential negative impacts on the rights of the First Nations would be partially reversible. That is because the users' perception, and thus the effects on their usages and the intergenerational transmission of values and related knowledge, could persist over time and not be restored completely from the adverse effects caused by the Project. The Agency notes that in a spill scenario, the impact on rights could last more than a generation. For this criterion, the Agency therefore considers that the severity of the impact level is moderate.
- **Cultural Welfare:** The Project is likely to have significant effects on the beluga whale, a species of great cultural significance for the Innu First Nations of the Pekuakamiulnuatsh and the Essipiunnuat. Although the analysis does not show that the Project could harm the overall capacity of the Innu First Nations to perpetuate their customs, traditions and practices, the Agency accounts for the expected effects on several components of the Innu cultural and physical heritage and concludes that the severity of the impact level for this criterion would be of moderate to high severity for the Innu First Nations of the Pekuakamiulnuatsh and the Essipiunnuat. Concerning the Innu First Nation of the Pessamiulnutsh, there is no indication that the Project could hinder the practice of its cultural activities. For this, the severity of the impact level would be low.
- **Health:** The analysis of the Project's effects do not show that the Project, excluding the risk of accidents, could change traditional food quality, abundance and access so as to alter the health of members of the Innu First Nation. The First Nations did not raise issues regarding the current state of physical, mental, emotional or spiritual health of their members, but instead indicated that some members who practise activities on the Saguenay are worried about the risk of accidents and contamination of resources. For this criterion, the Agency therefore concludes a low level of severity.
- **Cumulative Effects:** The Innu First Nations raised the point that their rights have been, still are, and could be affected by the past, present and future projects in the Project sector and upstream in the St. Lawrence River. The increase in traffic generated by the Project and by other projects could generate cumulative adverse impacts on the exercise of rights, primarily for users of the Saguenay River. The Project would have significant effects on the beluga whale, a species of cultural significance that is also a species at risk. The Agency also notes the special importance of the Saguenay River for the exercise of rights. It therefore considers that the Project would have cumulative effects of high severity for the Innu First Nations of the Pekuakamiulnuatsh and the Essipiunnuat. Concerning the Innu First Nation of the Pessamiulnutsh whose members do not practise on the Saguenay River and which did not identify

the beluga whale as a species of great cultural significance for it, the Project's impact level in terms of cumulative effects would be low.

- **Governance:** The Innu First Nations indicated that they did not favour the Project and that it would be contrary to their vision for development of the territory. Several uncertainties remain regarding the Project's effects on several components valued by the First Nations and on the effectiveness of mitigation measures proposed by the Proponent. The Agency concludes that the impact level in terms of governance would be of moderate severity.
- **Inequality of Impacts:** The Agency has not received information concerning the potential impacts on more vulnerable subgroups and thus cannot conclude on this criterion.

7.5.2 Huron-Wendat Nation

The Agency considers that the Project could cause impacts of moderate severity on the rights of the Huron-Wendat Nation.

- **Probability:** A high probability exists that one or more impacts will occur on the rights of the Huron-Wendat Nation, particularly the customary right to harvest resources for fishing. The increase in marine traffic generated by the Project and the presence of new marine infrastructure could have effects on the Wendat users in terms of access and experience. Although the Agency considers that the risk of accidents and malfunctions was assessed properly by the Proponent and that it proposes adequate measures to avoid this risk, it is likely that the members of the Nation who frequent the Saguenay River perceive this risk and fear a major ecological catastrophe in relation to the Project's activities. Huron-Wendat territoriality could be affected by the Project's impacts (in relation to the direct or perceived effects). In the absence of information on the current or projected economic activities by the Huron-Wendat Nation in the region, the Agency cannot take a position on the probability of the Project's impacts on this right.
- **Scope:** The level of repercussion regarding the scope of the potential impacts on the rights of the Huron-Wendat Nation would be low. Indeed, the impacts would occur over a special spatial range related to the exercise of the rights of the Huron-Wendat Nation and are not projected in places of preferred or exclusive use. However, they could occur over a large part of the Saguenay River used by the members of the Nation.
- **Frequency, Duration and Reversibility:** The Agency considers that the frequency, duration and reversibility of the impacts for the Huron-Wendat Nation would be the same as for the Innu First Nations. The severity for this criterion is considered moderate. The Agency also accounts for the fact that frequenting of the sector by the members of the Huron-Wendat Nation mainly occurs during the summer period. Thus, the interaction between the Project and the exercise of rights in this sector by the members of the Nation would be seasonal.
- **Cultural Welfare:** The rights of the Huron-Wendat Nation are based on a unique relationship with the territory. This relationship, Huron-Wendat territoriality, could be affected by the Project's potential impacts. The Nation emphasized the cultural importance of the Saguenay River, which constitutes the historic eastern boundary of its customary territory. It also indicated that the Project could create stress on the part of members using the river. However, the Project would not have major effects on species of

special cultural significance for the Huron-Wendat Nation and would not hinder, a priori, the Nation's capacity to maintain its customs, traditions or practices that are an integral part of its distinctive culture. The security for this criterion would be low to moderate.

- **Health:** The severity for this criterion is considered low for the same reasons as those set out for the Innu First Nations.
- **Cumulative Effects:** The Huron-Wendat Nation shared its concerns regarding the cumulative effects of the Project on its rights. The increase in traffic generated by the Project and by other projects could generate cumulative adverse impacts on the exercise of rights. The severity of the cumulative effects on the rights of the Huron-Wendat Nation would be moderate.
- **Governance:** The Huron-Wendat Nation mentioned that the Project could alter its ability to derive future economic benefits from the territory and the resources. It also mentioned that the Project could have positive economic benefits if a collaborative relationship were established with the Proponent. The Agency cannot conclude on this aspect without more information on the Nation's vision for this criterion.
- **Inequality of Impacts:** The Agency has not received information concerning the potential impacts on more vulnerable subgroups and thus cannot conclude on this aspect.

7.5.3 Wolastoqiyik Wahsipekuk First Nation

The Agency considers that the Project would not cause adverse impacts, *a priori*, on the rights of the Wolastoqiyik Wahsipekuk First Nation.

A major spill could cause impacts on the First Nation's economic rights and interests. However, the Agency considers that the risk of accidents, although not nonexistent, was assessed correctly by the Proponent and that the mitigation measures that would be deployed would allow management of this risk.

Given the uncertainties concerning the Project's potential impacts on the Aboriginal rights of the Wolastoqiyik Wahsipekuk First Nation in the study area, the Agency reiterates the importance of involving the First Nation in the follow-ups of the components it considers relevant, by ensuring integration of any new information from the First Nation concerning the use of the territory by its members.

7.6 First Nations Perspectives on the Analysis of the Impacts on Rights and the Environmental Assessment of the Project

The consultation on the draft environmental assessment report will allow gathering of the First Nations' final comments on the process and the content of the assessment. However, it is possible from now on to identify two limits to the assessment that they shared with the Agency.

- Independent of the distinction between the Énergie Saguenay and Gazoduq projects, the Innu First Nations indicated they consider the liquefaction plant, marine shipping and the gas pipeline in a unique

environmental logic and expressed their disagreement regarding the separate assessment of the two projects.

- Concerning the environmental assessment of the Project as a whole, the First Nations expressed reservations regarding the assessment of the cumulative effects on the biological and human environments and consider this assessment deficient.
- The Innu First Nations also indicated they understand that the scope of the assessment does not account for downstream greenhouse gas emissions, but mentioned this point's importance to determine the Project's acceptability. They also mentioned the lack of information on the downstream use of natural gas exported to other countries and its real role of substitution for more highly polluting energies.

The follow-up of these concerns and the comments provided by the First Nations throughout the process is presented in summary in Appendix D.

8. Agency Conclusions and Recommendations

In preparing this report, the Agency considered the Proponent's Environmental Impact Statement, its responses to information requests, and the comments and feedback from the public, government agencies and First Nations.

The environmental effects of the Project and their significance, as well as the potential for cumulative environmental effects, were determined using assessment methods and analytical tools that reflect accepted practices in the field of environmental and socioeconomic assessment, including the assessment of the consequences of potential accidents and malfunctions.

The Agency concludes that the Project is likely to cause direct and cumulative significant adverse environmental effects, as defined in the *Canadian Environmental Assessment Act, 2012*, on the following components, despite the implementation of mitigation and follow-up measures:

- Greenhouse gas emissions;
- Marine mammals, including beluga whales;
- Cultural heritage of Innu First Nations.

The Agency considers that the Project is likely to cause moderate to high adverse impacts on the Aboriginal and treaty rights of the Pekuakamiulnuatsh Innu First Nations, the Essipiunnuat and the Pessamiulnutsh Innu First Nations in relation to the place occupied by the study area for the practice of their customary activities and with the direct and significant cumulative effects on the beluga whale, a species of high cultural importance, particularly for the Essipiunnuat and the Pekuakamiulnuatsh. The Agency also notes the opposition of these First Nations to the Project. The potential impacts on the rights of the Huron-Wendat Nation would be of moderate severity and mainly related to the Project's impact on their customary activities. Concerning the Wolastoqiyik Wahsipekuk First Nation, the Agency has not received any information concerning the exercise of rights by its members in the study area.

Furthermore, the Agency concludes that the Project is not likely to cause significant adverse environmental effects on other components of the environment under federal jurisdiction, taking into account the implementation of mitigation measures.

The Agency has identified mitigation measures and follow-up program requirements that will be proposed to the Minister of Environment and Climate Change in making his decision on the significance of the adverse environmental effects that may result from the Project. If the Minister determines that the Project is likely to cause significant adverse environmental effects, he 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 the effects are justifiable, the Minister of Environment and Climate Change will set out the conditions under which the Project may proceed in his Decision Statement under the *Canadian Environmental Assessment Act, 2012*. The conditions set by the Minister would be binding on the Proponent.

In addition, if the Project is allowed to proceed, the Agency expects that all commitments made by the Proponent during the environmental assessment process will be implemented to ensure that the Project is carried out in a careful and prudent manner.

9. References

AGENCE MAMU INNU KAIKUSSEHT(AMIK), 2021. [Online]

ASSOCIATION DE GESTION HALIEUTIQUE MI'GMAQ ET MALÉCITE (AGHAMM), 2021. [Online]

BEAUCHMAP, J., BOUCHARD, H., DE MARGERIE, P., OTIS, N., SAVARIA, J.-Y., 2009. Recovery strategy for the blue whale (*Balaenoptera musculus*), Northwest Atlantic population, in Canada. *Species at Risk Act* recovery strategy series. Fisheries and Oceans Canada, Ottawa. 64p.

BLANE, J. M., and JAAKSON, R., 1994. The impact of ecotourism boats on the St Lawrence beluga whales. Environmental Conservation (21), 267–269.

BUREAU D'AUDIENCES PUBLIQUES SUR L'ENVIRONNEMENT (BAPE), March 2021. Projet de construction d'un complexe de liquéfaction de gaz naturel à Saguenay. Rapport d'enquête et d'audience publique.

CANADIAN COUNCIL OF MINISTERS OF THE ENVIRONMENT (CCME), 2019. Management guide for atmospheric management areas.

CENTRE INTÉGRÉ UNIVERSITAIRE DE SANTÉ ET DE SERVICES SOCIAUX DU SAGUENAY-LAC-SAINT-JEAN (CIUSSS-LSJ), 2020. Enquête de santé du Saguenay-Lac-Saint-Jean 2018.

CHION C., PARROTT L. and J.-A. LANDRY. 2012. Collisions et cooccurrences entre navires marchands et baleines dans l'estuaire du Saint-Laurent – Évaluation de scénarios de mitigation et recommandations. Rapport présenté au Groupe de travail sur le trafic maritime et la protection des mammifères marins, Parcs Canada et Pêches et Océans Canada. Université de Montréal et École de technologie supérieure : Montréal. 80p.

CHION, C., 2017. Impacts des mesures volontaires visant à réduire les risques de collisions mortelles de grands rorquals avec des navires marchands dans l'estuaire du Saint-Laurent en 2016 : Mise à jour de l'évaluation des gains en conservation des mesures volontaires proposées par le Groupe de travail sur le transport maritime et la protection des mammifères marins (G2T3M) et évaluation de leur impact sur le temps de transit des navires marchands. 15p.

CHION, C., BONNELL, T., LAGROIS, D., GUETTÉ, A., MICHAUD, R., DUPUCH, A., DUPRAS, J., 2019. Modélisation du trafic maritime et des déplacements des baleines dans l'estuaire du Saint-Laurent et le Saguenay pour informer le processus de réduction des impacts cumulatifs de la navigation sur les bélugas et les grands rorquals dans le contexte du déploiement de la Stratégie maritime du Québec. Rapport de l'Université du Québec en Outaouais pour le Ministère des Forêts, de la Faune et des Parcs du Québec. 128p.

CHION, C., MICHAUD, R., BONNELL, T., LAGROIS, D., GUETTÉ, A., DUPUCH, A., DUPRAS, J., 2020. Modélisation du trafic maritime et des déplacements des baleines dans l'estuaire du Saint-Laurent et le Saguenay pour informer le processus de réduction des impacts cumulatifs de la navigation sur les bélugas et les grands rorquals dans le contexte du déploiement de la Stratégie maritime du Québec :

Rapport d'activités – An # 1 (2018-2019) Programme de recherche 2018-2023, Université du Québec en Outaouais et Groupe de recherche et d'éducation sur les mammifères marins.

CHOU, E., SOUTHALL, B. L., ROBARDS, M., ROSENBAUM, H. C., 2021. International policy, recommendations, actions and mitigation efforts of anthropogenic underwater noise. Ocean & Coastal Management (202).

COLLECTIF DE L'ANSE-À-PELLETIER, June 2019. Projet Énergie Saguenay – Commentaires sur l'étude d'impact environnementale. 23p.

COMITÉ ZIP SAGUENAY-CHARLEVOIX, June 2019. Commentaires du Comité ZIP Saguenay-Charlevoix à l'ACEE sur les effets potentiels du projet Énergie Saguenay et mesures proposées pour prévenir ou atténuer ces effets. 9p.

COMMITTEE ON THE STATUS OF ENDANGERED WILDLIFE IN CANADA (COSEWIC), 2016. COSEWIC assessment and status report on the Evening Grosbeak (*Coccothraustes vespertinusin*) Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. 77p.

COMMITTEE ON THE STATUS OF ENDANGERED WILDLIFE IN CANADA (COSEWIC), 2018. COSEWIC assessment and status report on the midland painted turtle (*Chrysemys picta marginata*) and the eastern painted turtle (*Chrysemys picta picta*) in Canada.

CONSEIL DE LA NATION HURONNE-WENDAT, June 2019. Consultation sur l'examen de l'étude d'impact environnemental du projet Énergie Saguenay. Présenté à : l'Agence canadienne d'évaluation environnementale. 49p.

CONSEIL DE LA PREMIÈRE NATION DES INNUS ESSIPIT, June 2019. Examen de l'étude d'impact environnemental du projet Énergie Saguenay par le promoteur GNL Québec. 18p.

CONSEIL DES INNUS DE PESSAMIT, June 2019. Examen de l'étude d'impact environnemental du projet Énergie Saguenay, commentaires de natures générique et spécifique sur l'ÉIE. 9p.

CONSEIL POUR LA RÉDUCTION DES ACCIDENTS INDUSTRIELS MAJEURS (CRAIM), June 2017. Risk management guide for major technological accident, 7th edition.

CONVERSANO, M., TURGEON, S. and MÉNARD, N., 2017. Caractérisation de l'utilisation de l'embouchure du Saguenay et de la baie Sainte-Marguerite par le béluga du Saint-Laurent et par le trafic maritime entre 2003 et 2016; Analyse des données d'observation terrestre et recommandations sur des mesures de gestion visant à réduire le dérangement dans les aires de haute résidence du béluga dans le parc marin du Saguenay−Saint-Laurent. Parcs Canada, Parc Marin du Saquenay-Saint-Laurent, Tadoussac, QC.

ENVIRONMENT AND CLIMATE CHANGE CANADA (ECCC), 2018. Recovery strategy for the Little brown myotis (*Myotis lucifugus*), the Northern myotis (*Myotis septentrionalis*), and the Tri-colored bat (*Perimyotis subflavus*) in Canada, Ottawa. 189p.

ENVIRONMENT AND CLIMATE CHANGE CANADA (ECCC), 2020. Canadian environmental sustainability indicators: greenhouse gas emissions. [Online]

ENVIRONMENT AND CLIMATE CHANGE CANADA (ECCC), 2021. Canada's official greenhouse gas inventory. [Online]

ENVIRONMENT CANADA, 1991. Federal policy on wetland conservation. 15p.

ENVIRONMENT CANADA, 1996. The Federal policy on wetland conservation: implementation guide for federal land managers. 26p.

ENVIRONNEMENT CANADA. 2016. Canada warbler (*Cardellina canadensis*): recovery strategy 2016, Ottawa. 62p.

ERBE, C., MARLEY, S.A., SCHOEMAN, R.P., SMITH, J.N., TRIGG, L.E. and EMBLING, C.B., 2019. The effects of ship noise on marine mammals—A review. Frontiers in marine science.

FISHERIES AND OCEANS CANADA, December 2009. Recovery strategy for the blue whale (*Balaenoptera musculus*), Northwest Atlantic population, in Canada. 75p.

FISHERIES AND OCEANS CANADA, March 2012. Recovery strategy for the beluga whale (*Delphinapterus leucas*), St. Lawrence estuary population in Canada. 108p.

FISHERIES AND OCEANS CANADA, 2014. Impacts of rerouting marine traffic in the St. Lawrence estuary on beluga (*Delphinapterus Leucas*): science in support of risk management.

FISHERIES AND OCEANS CANADA, 2017. A science based review of recovery actions for three at-risk whale populations - a commitment of the Government of Canada's Oceans Protection Plan. 33p.

FISHERIES AND OCEANS CANADA, July 2018. Potential effects of the construction of marine terminals in the Saguenay fjord on St. Lawrence beluga and its habitat. 22p.

FISHERIES AND OCEANS CANADA, 2020. Action plan to reduce the impact of noise on the beluga whale (*Delphinapterus leucas*) and other marine mammals at risk in the St. Lawrence estuary, Ottawa. 34p.

FISHERIES AND OCEANS CANADA, 2021. Avis final de Pêches et Océans Canada dans le cadre de l'évaluation environnementale du projet Énergie Saguenay (*French Only*). 30p.

GERVAISE, C., SIMARD, Y., ROY, N., KINDA, B., MÉNARD, N., 2012. Shipping noise in whale habitat: characteristics, sources, budget, and impact on beluga in Saguenay–St. Lawrence Marine Park hub. Journal of the Acoustical Society of America (132), 76-89.

GNL QUÉBEC INC., August 2020. Projet Énergie Saguenay. Complexe de liquéfaction de gaz naturel à Saguenay. Dépôt de l'addenda 1 du document-réponses en complément à la première demande d'information sur l'étude d'impact environnemental et révision de la portée du projet en lien avec la navigation (No dossier 005543). 33p.

GOUVERNMENT OF QUEBEC, August 2021. Gazette officielle du Québec,153th year, nº 32 – Order in Council 1071-2021 on July 21, 2021, 3 p.

HEALTH CANADA, 2016. Guidance for evaluating human health impacts in environmental assessment: air quality.

HEALTH CANADA, 2017. Guidance for evaluating human health impacts in environmental assessment: noise.

HEALTH CANADA, 2018. Toxic substances list: sulphur dioxide. [Online]

IMPACT ASSESSMENT AGENCY OF CANADA (AGENCY), March 2015. Technical guidance for assessing physical and cultural heritage or any structure, site or thing. [Online]

JOLY, M., S. PRIMEAU, M. SAGER and A. BAZOGE, 2008. Guide d'élaboration d'un plan de conservation des milieux humides, Première édition, Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. 68p.

LESAGE, V., BARRETTE, C., KINGSLEY, M. C. S., and SJARE, B., 1999. The effect of vessel noise on the vocal behaviour of belugas in the St. Lawrence River estuary, Canada. Marine Mammal Science (15), 65–84.

LESAGE, V., MCQUINN, I.H., CARRIER, D., GOSSELIN, J.-F., MOSNIER, A., 2014a. Exposure of the beluga (*Delphinapterus leucas*) to marine traffic under various scenarios of transit route diversion in the St. Lawrence Estuary. 28p.

LESAGE, V., MOSNIER, A., MEASURES, L., LAIR, S., BÉLAND, P., 2014b. Mortality patterns in St. Lawrence estuary beluga (*Delphinapterus leucas*), inferred from the carcass recovery data, 1983-2012. 24p.

MCQUINN, I., LESAGE, V., CARRIER, D., LARRIVÉE, G., SAMSON, Y., CHARTRAND, S., MICHAUD, R., THERIAULT, J., 2011. A threatened beluga (*Delphinapterus leucas*) population in the traffic lane: vessel-generated noise characteristics of the Saguenay-St. Lawrence Marine Park, Canada, Journal of the Acoustical Society of America (130): 3661-3673.

MÉNARD, N., CONVERSANO, M., TURGEON, S., 2018. La protection des habitats de la population de bélugas (*Delphinapterus leucas*) du Saint-Laurent : bilan et considérations sur les besoins de conservation. Le Naturaliste canadien, 142 (2) : 80-105.

MÉNARD, N., MICHAUD, R., CHION, C., TURGEON, S., 2014. Documentation of maritime traffic and navigational interactions with St. Lawrence estuary beluga (*Delphinaterus leucas*) in calving areas between 2003 and 2012. 28p.

MINISTÈRE DE L'ENVIRONNEMENT ET DE LA LUTTE CONTRE LES CHANGEMENTS CLIMATIQUES (MELCC), 2018. Rapport d'avancement 2018 par rapport aux normes canadiennes de la qualité de l'air ambiant, Québec, Direction de la qualité de l'air et du climat. 16p. [Online]

MINISTÈRE DE L'ENVIRONNEMENT ET DE LA LUTTE CONTRE LES CHANGEMENTS CLIMATIQUES (MELCC), 2020. Inventaire québécois des émissions de gaz à effet de serre en 2018 et leur évolution depuis 1990. Gouvernement du Québec. [En ligne]

MINISTÈRE DE L'ENVIRONNEMENT ET DE LA LUTTE CONTRE LES CHANGEMENTS CLIMATIQUES (MELCC), 2021. L'évaluation environnementale - Un régime d'autorisation environnementale moderne, clair et prévisible. Gouvernement du Québec. [Online]

MINISTÈRE DE L'ENVIRONNEMENT ET DE LA LUTTE CONTRE LES CHANGEMENTS CLIMATIQUES (MELCC), June 2021. Rapport d'analyse environnementale pour le projet Énergie Saguenay Complexe de liquéfaction de gaz naturel à Saguenay par GNL Québec inc. – Dossier 3211-10-021 – le 30 juin 2021. Gouvernement du Québec. [Online]

NATURE QUÉBEC, June 2019. Commentaires et questions de Nature Québec sur l'étude d'impact du projet Énergie Saguenay du promoteur GNL Québec – 17 juin 2019. 8p.

ORGANISME DE BASSIN VERSANT DU SAGUENAY (OBV SAGUENAY), June 2019. Commentaires sur l'étude d'impact du projet Énergie Saguenay, arrondissement de La Baie de la ville de Saguenay, Québec. 7p.

PARC AVENTURES CAP JASEUX, June 2019. Projet Énergie Saguenay – Impacts sur le Parc Aventures Cap Jaseux. 14p.

PEKUAKAMIULNUATSH TAKUHIKAN, June 2019. Commentaires de la direction Droits et protection du territoire – Sur L'étude environnementale du Projet d'Énergie Saguenay. 10p.

PEKUAKAMIULNUATSH TAKUHIKAN, CONSEIL DE LA PREMIÈRE NATION DES INNUS ESSIPIT ET CONSEIL DES INNUS DE PESSAMIT, October 2020. Projet de construction d'un complexe de liquéfaction de gaz naturel à Saguenay. Rapport présenté au Bureau d'audience publique sur l'environnement (BAPE). 48p.

ROY, N. et SIMARD, Y. 2016. Bruit ambiant et fréquentation de la région de Cacouna par le béluga du Saint-Laurent à l'été 2014 par monitorage acoustique continu. 22p.

TOURISME SAGUENAY–LAC-SAINT-JEAN- TSLSJ, June 2019. L'avis de l'industrie touristique du Saguenay–Lac-Saint-Jean sur le projet Énergie Saguenay – Projet Énergie Saguenay – Mémoire déposé auprès de l'agence canadienne d'évaluation environnementale. 6p.

TRANSFERT ENVIRONNEMENT ET SOCIÉTÉ, April 2018. Étude sur le savoir autochtone et l'utilisation des ressources et du territoire dans le cadre du projet Énergie Saguenay de GNL Québec. 97p.

WSP, April 2019. Projet Énergie Saguenay - Renseignements et clarifications demandés par l'ACEE pour la concordance de l'étude d'impact sur l'environnement, Rapport produit pour GNL Québec inc. 58p.

WSP, April 2021. Projet Énergie Saguenay. Complément à la deuxième série de réponses aux questions et commentaires de l'AEIC – Complexe de liquéfaction de gaz naturel à Saguenay. Rapport produit pour GNL Québec inc. 192p.

WSP, December 2020. Projet Énergie Saguenay. Deuxième série de réponses aux questions et commentaires de l'AEIC - Complexe de liquéfaction de gaz naturel à Saguenay. Rapport produit pour GNL Québec inc. 486p.

WSP, January 2019. Étude d'impact environnemental, Projet Énergie Saguenay, Rapport produit pour GNL Québec inc. 1026p.

WSP, January 2020. Projet Énergie Saguenay. Réponses aux questions et commentaires de l'AEIC - Complexe de liquéfaction de gaz naturel à Saguenay. Rapport produit pour GNL Québec inc. 422p.

WSP, June 2020. Projet Énergie Saguenay. Complément à la première série de réponses aux questions et commentaires de l'AÉIC – Complexe de liquéfaction de gaz naturel à Saguenay. Rapport produit pour GNL Québec inc. 137p.

WSP and GROUPE CONSEIL NUTSHIMIT-NIPPOUR (GCNN), April 2018. Projet Énergie Saguenay. Rapport sectoriel – Contexte socioéconomique, Rapport produit pour GNL Québec inc. 43p.

WSP and GROUPE CONSEIL NUTSHIMIT-NIPPOUR (GCNN), November 2018. Projet Énergie Saguenay - Rapport sectoriel – Paysage, Rapport produit pour GNL Québec inc. 29p.

Appendix

Appendix A: Criteria for Assessing Environmental Effects

General definitions of the criteria used to assess residual effects on each valued component (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 lifecycle (migration, reproduction, feeding, etc.) or a period during which a cultural, spiritual or recreational practice by a First Nation or population would occur (for example, 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 criterion[100]

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 (for example, 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.

[100] 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 criteria
Marine mammals, including the St. Lawrence beluga whale	
LOW	Effects would have **little or no effect** on one or more important lifecycle stages of marine mammals. **For marine mammal species at risk**[101] : The effects **would not adversely affect** the maintenance or management **or** recovery of one **or** more of these species.
MEDIUM	The effects **would interfere** with one or more important phases of the marine mammal lifecycle, **BUT not with the maintenance** of the marine mammal population. **For marine mammal species at risk**: Effects on these species **are expected, BUT measures** (compensatory or protective) **could be put in place** to not adversely affect the maintenance **or** management **or** recovery of one or more of these species.
HIGH	The effects would be **detrimental** to the maintenance of the marine mammal population. **For marine mammal species at risk**: Effects on these species are expected and **measures that could be implemented would not be sufficient** to ensure the maintenance **or** recovery of one **or** more of these species.
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 lifecycle of fish. In the case of special-status fish: The effects **would not disrupt** the sustainability **and/or** management **and/or** recovery of one or more of these species.

[101] Species at risk at the federal level or recommended by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

Levels	Definition of levels for the magnitude criteria
MEDIUM	The effects would **disrupt** one or more sensitive phases of the lifecycle 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.
Wetlands and Vegetation	
LOW	In the case of wetlands in "areas where wetland losses or functional values require that special measures be applied"[102] **and/or** in an area where wetlands have been designated as having ecological or socioeconomic importance:[103] The effects **would not limit or reduce** the ecological or socioeconomic 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 socioeconomic function are expected in wetlands of **lesser ecological value.**[104]
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 socioeconomic importance: The effects **would affect** wetlands, **BUT** without causing any **net loss** of wetland ecological or socioeconomic functions. In the case of wetlands outside of such areas:

[102] Taken from: Environment Canada, 1996. Federal Policy on Wetland Conservation Implementation Guide for Federal Land Managers. 23 pages and appendices.
[103] Taken from: Environment Canada, 1991. Federal Policy on Wetland Conservation. 15 pages.
[104] 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.

Levels	Definition of levels for the magnitude criteria
	Effects **would affect** wetlands and alterations or losses of ecological or socioeconomic functions are expected on wetlands of **medium to high ecological value, BUT measures (compensatory or protective) could be put in place** to ensure that wetlands are not adversely affected.
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 socioeconomic importance: The effects would cause a **net loss** of wetland ecological or socioeconomic functions. In the case of wetlands outside of such areas: Effects would affect wetlands and alterations or losses of ecological or socioeconomic functions are expected on wetlands with **moderate to high ecological value AND** no measures (compensatory or protective) could be put in place to reduce these effects.
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 lifecycle 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 lifecycle of birds, **BUT without harming the sustainability** of the bird population. In the case of special-status birds: 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.

Levels	Definition of levels for the magnitude criteria
Terrestrial fauna at risk	
LOW	The effects **would not disrupt** the maintenance **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.
Current use[105] of lands and resources for traditional purposes[106] by Indigenous peoples	
LOW	The effects would alter the conditions of traditional practices[107] 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**.

[105] 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 lifecycle 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.

[106] 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.

[107] 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.

Levels	Definition of levels for the magnitude criteria
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.
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

Levels	Definition of levels for the magnitude criteria
	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**.
Socioeconomic conditions[108]	
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**.
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.

[108] 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 (for example, jobs, education, facilities, housing, infrastructure, community social services and physical community infrastructure, medical and social services, or recreational services and facilities).

Levels	Definition of levels for the magnitude criteria
	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**.

Table 20: Decision Tree for Determining Overall Significance of a Residual Effect

High 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	High	Significant	Site-specific	Long term	Continuous	Irreversible	High	Significant
			Partially	High	Significant				Partially	High	Significant				Partially	High	Significant
			Reversible	High	Significant				Reversible	High	Significant				Reversible	High	Significant
		Intermittent	Irreversible	High	Significant			Intermittent	Irreversible	High	Significant			Intermittent	Irreversible	High	Significant
			Partially	High	Significant				Partially	High	Significant				Partially	High	Significant
			Reversible	High	Significant				Reversible	High	Significant				Reversible	High	Significant
		Once	Irreversible	High	Significant			Once	Irreversible	High	Significant			Once	Irreversible	High	Significant
			Partially	High	Significant				Partially	High	Significant				Partially	High	Significant
			Reversible	High	Significant				Reversible	High	Significant				Reversible	High	Significant
	Medium term	Continuous	Irreversible	High	Significant		Medium term	Continuous	Irreversible	High	Significant		Medium term	Continuous	Irreversible	High	Significant
			Partially	High	Significant				Partially	High	Significant				Partially	High	Significant
			Reversible	High	Significant				Reversible	High	Significant				Reversible	High	Significant
		Intermittent	Irreversible	High	Significant			Intermittent	Irreversible	High	Significant			Intermittent	Irreversible	High	Significant
			Partially	High	Significant				Partially	High	Significant				Partially	High	Significant
			Reversible	High	Significant				Reversible	High	Significant				Reversible	Moderate	Not Significant
		Once	Irreversible	High	Significant			Once	Irreversible	High	Significant			Once	Irreversible	High	Significant
			Partially	High	Significant				Partially	High	Significant				Partially	Moderate	Not Significant
			Reversible	High	Significant				Reversible	Moderate	Not Significant				Reversible	Moderate	Not Significant
	Short term or temporary	Continuous	Irreversible	High	Significant		Short term or temporary	Continuous	Irreversible	High	Significant		Short term or temporary	Continuous	Irreversible	High	Significant
			Partially	High	Significant				Partially	High	Significant				Partially	High	Significant
			Reversible	High	Significant				Reversible	High	Significant				Reversible	Moderate	Not Significant
		Intermittent	Irreversible	High	Significant			Intermittent	Irreversible	High	Significant			Intermittent	Irreversible	High	Significant
			Partially	High	Significant				Partially	High	Significant				Partially	Moderate	Not Significant
			Reversible	High	Significant				Reversible	Moderate	Not Significant				Reversible	Moderate	Not Significant
		Once	Irreversible	High	Significant			Once	Irreversible	High	Significant			Once	Irreversible	Moderate	Not Significant
			Partially	High	Significant				Partially	Moderate	Not Significant				Partially	Moderate	Not Significant
			Reversible	High	Significant				Reversible	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	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	Moderate	Not Significant
			Reversible	Moderate	Not Significant				Reversible	Moderate	Not Significant				Reversible	Moderate	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
Transboundary Environmental Effects - Greenhouse Gas Emissions		
• Total greenhouse gas emissions of approximately 283 kilotonnes of CO_2 equivalent for the five-year construction phase and approximately 489 kilotonnes of CO_2 equivalent annually for the operation phase. With the addition of land-use change emissions, the Project would emit approximately 502 kilotonnes of CO_2 equivalent per year in the operational phase. • 15th largest emitter of greenhouse gases in Quebec according to 2018 data. • If the Project is approved, emissions from the Project and upstream emissions could have a negative effect on Canada's plan to achieve net zero emissions by 2050. • Greenhouse gas emissions have global environmental effects because of their cumulative nature and their contribution to climate change.	The contribution of greenhouse gas emissions from the Project would be continuous and would contribute to the accumulation of greenhouse gases in the atmosphere as well as in the oceans, and would be long-lasting and irreversible due to the persistence of CO_2.	**Important** The Project would result in significant adverse transboundary environmental effects, both direct and cumulative, due to its large contribution to provincial and national greenhouse gas emissions, despite the implementation of the mitigation measures proposed by the Proponent.
Marine mammals, including the St. Lawrence Beluga Whale		
• No residual effect during the construction phase, taking into account the key mitigation measures. • Unlikely to have significant adverse effects on seals. • The Project would double the amount of vessel traffic in the Saguenay River, within a protected area, where a relatively quiet portion of the beluga whale's critical habitat is located, including that used by females and calves. The increase in the number of vessel passages in the Saguenay River and the St. Lawrence Estuary would contribute to the degradation of the underwater acoustic environment, which would be contrary to the objectives of the action plans and recovery programs for marine mammals at risk in the St. Lawrence Estuary as well as to the protection mandate of the protected area.	Magnitude: High. Extent: Regional. Duration: Long term. Frequency: Intermittent. Reversibility: Reversible.	**Important** With the implementation of key mitigation measures, the Agency considers that the level of residual direct and cumulative effects of the Project on beluga whales would be high.
Fish and their habitat		
Habitat Destruction and Modification: • The construction of the terminal would result in the destruction and alteration of approximately 600 square metres of fish habitat due to the encroachment of the loading docks and dolphins, as well as potential effects on the surrounding aquatic grass beds. • Uncertainty about the effects on fish and fish habitat caused by the work methods that would be used and whether or not blasting and pile driving would be used in the construction of the terminal.	Magnitude: Low. Extent: Local and regional. Duration: Long term. Frequency: Continuous. Reversibility: Partially reversible in time and irreversible on the habitat.	**No Important** With the implementation of key mitigation measures, the Agency assesses that the residual effects of the Project on fish and fish habitat, including benthic fauna and species at risk, would be moderate.

Potential residual effects	Characterization of potential residual effects	Significance of potential residual adverse environmental effects
Fish and their habitat (continued)		
Water quality • A residual effect of the Project on fish and fish habitat is likely through the introduction of invasive aquatic species. • Lack of information on snow and ice removal operations for marine infrastructure.	Magnitude: Low. Extent: Local and regional. Duration: Long term. Frequency: Continuous. Reversibility: Partially reversible in time and irreversible on the habitat.	**No Important** With the implementation of key mitigation measures, the Agency assesses that the residual effects of the Project on fish and fish habitat, including benthic fauna and species at risk, would be moderate.
Vegetation and wetlands		
• Total encroachment of 101.6 hectares (15.1 hectares temporary and 86.5 hectares permanent) of terrestrial vegetation. • Permanent encroachment on the shoreline of the outlet of the unnamed lake #2 (EC-03) in the order of 1.36 hectares as well as a permanent encroachment of 11.1 hectares on the wetlands. • Transportation of materials and machinery could encourage the introduction and spread of invasive alien plant species	Magnitude: Medium. Extent: Site-specific. Duration: Long term. Frequency: Continuous. Reversibility: Irreversible.	**No Important** Based on the implementation of key mitigation measures and the Proponent's commitments under the provincial wetland and water laws and regulations, the Agency concludes that the residual effects of the Project on vegetation and wetlands would be moderate.
Birds and their habitat		

Habitat Destruction and Modification:
• Permanent habitat losses caused by the project:
  ○ 70.02 hectares (230 nesting pairs) in softwood forests.
  ○ 16.45 hectares (51 nesting pairs) in mixed hardwood-dominated stands.
• For species at risk :
  ○ 30.21 hectares for the Canada warbler (3 nesting pairs).
  ○ A pair of Wandering grosbeaks.
  ○ Loss of potential nesting and foraging habitat for Whip-poor-will (10.07 hectares), Eastern Wood-pewee (0.05 hectares), Barn swallow (3.87 hectares) and Rusty blackbird (3.36 hectares).
Disturbance:
• Noise and light generated by the Project could drive birds away from the area or alter their behavior. These sensory effects would be localized.
	Magnitude: Low.
	Extent: Local.
	Duration: Long term.
	Frequency: Continuous.
	Reversibility: Partially reversible in time and irreversible on the habitat.
		No Important
		With the implementation of key mitigation measures, the Agency considers that the residual effects of the Project on birds and their habitats, including species at risk, would be moderate.

Terrestrial wildlife at risk		
• Wildlife species could be disturbed by noise, traffic, machinery and artificial light at night. **Bats** • 2.39 hectares of the optimal roosting area for bat species (65.39 hectares) would be permanently affected by the Project and 0.17 hectares temporarily, or less than 4% of the optimal roosting habitat. **Turtles** • 3.77 hectares of their potential restricted area habitat would be affected by permanent infrastructure and less than 0.01 hectares by temporary infrastructure.	Magnitude: Medium. Extent: Site-specific. Duration: Medium to long term. Frequency: Continuous. Reversibility: Partially reversible in time and irreversible on the habitat.	**No Important** With the implementation of key mitigation measures, the Agency assesses that the residual effects of the Project on terrestrial wildlife at risk would be moderate.

Potential residual effects	Characterization of potential residual effects	Significance of potential residual adverse environmental effects
Current Uses of Land and Resources for Traditional Purposes		
Fishing and hunting activities : • The visual footprint of these vessels, the transformation of the landscape, and the perception of safety risk by users could influence the use and continuation of traditional activities including fishing and navigation. **Changes in access and land use:** • The increase in the number of vessels and the increased risk of accidents and collisions could have an impact on the safe access of First Nations to their practice areas. • The experience of the Innu First Nations and the Huron-Wendat Nation on the Saguenay River and on the river could be altered by the presence of a greater number of vessels and larger vessels.	Magnitude: Medium. Extent: Regional. Duration: Long term. Frequency: Intermittent. Reversibility: Partially reversible.	**No important** The level of effect of the Project on the current use of lands and resources for traditional purposes by the Innu First Nations and the Huron-Wendat Nation would be moderate.
Natural and cultural heritage		
Natural and Cultural heritage : • Visual effects for observers located in the North Arm of the fjord landscape unit (R3), more specifically for users of the Parc Aventures Cap Jaseux sector, residents of the Jalbert and Anse-à-Pelletier islands as well as users navigating on the fjord in the Project sector. **Archaeology:** • Construction work could result in the accidental breakage of objects, the displacement of artifacts, the uncovering of archaeological resources related to the First Nations or to the Euro-Canadian presence. **Cultural heritage of Innu First Nations:** • The eventual disappearance of the beluga whale would cause the disappearance of a part of the distinctive culture of the Innu First Nations.	**Natural heritage and archaeology** Magnitude: Medium. Extent: Local. Duration: Long term. Frequency: Continuous. Reversibility: Irreversible. **Cultural heritage of Innu First Nations** Magnitude: Medium. Extent: Regional. Duration: Long term. Frequency: Continuous. Reversibility: Partially reversible.	**No important - Natural heritage and archaeology** The Agency concludes that the level of effect on archaeological resources and landscape modification on heritage would be moderate. **Important - Cultural Heritage** The Agency concludes that the level of effect on the cultural heritage of the Innu First Nations would be high since the beluga is part of the cultural heritage of the Essipiunnuat, the Pekuakamiulnuatsh and the Pessamiulnutsh Innu First Nations.
Socioeconomic conditions		
Changes to the landscape: • Residual visual effects could exist for observers and users navigating on the Saguenay River in the project area. **Increase in maritime traffic** • The significant negative environmental effects of the Project on the beluga whale could alter the balance of biodiversity in the area. Such an alteration would diminish the attractiveness and the natural assets valued by the tourist clientele who choose the St. Lawrence Estuary and the Saguenay Fjord as their destination. • The increase in shipping associated with the Project could also increase conflicts of use among users of the marine park. • Socioeconomic conditions related to First Nations commercial fishing activities in the St. Lawrence Estuary could be affected if an accident occurs in this sector.	Magnitude: Medium. Extent: Regional. Duration: Long term. Frequency: Intermittent. Reversibility: Partially reversible.	**No important** With the implementation of key mitigation measures, the Agency assesses that the residual effects of the Project on socioeconomic conditions related to recreation and tourism and marine mammal viewing would be moderate.

Potential residual effects	Characterization of potential residual effects	Significance of potential residual adverse environmental effects
Human health (physical and psychological)		
Air Quality: • The Project could have an impact on air quality overall, particularly during the operational phase, due in part to the future increase in ship traffic. **Noise:** • Noise levels could result in adverse health effects to nearby populations. **Lighted atmosphere:** • The light environment could be a source of stress and anxiety for some individuals who place a higher value on the current environment or who would be more exposed to landscape changes. **Water contamination:** • A spill, linked to accidents or failures, could affect the quality of the water and natural environments as well as the fishery resources consumed.	Magnitude: Medium. Extent: Local. Duration: Long term. Frequency: Continuous. Reversibility: Partially reversible.	**No important** With the implementation of key mitigation measures, the Agency assesses that the residual effects of the Project on human health would be moderate.

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
Transboundary Environmental Effects – Greenhouse Gas Emissions	**Key Mitigation Measures** • Develop, to the satisfaction of Environment and Climate Change Canada, a greenhouse gas management plan to reduce the Project's greenhouse gas emissions during each phase and submit a plan to the Agency before the construction phase. The emphasis should be placed on reduction of greenhouse gas emissions as soon as possible during the Project's lifecycle. It will need to take into account applicable provincial and federal greenhouse gas reduction strategies. The greenhouse gas management plan must include the following measures: ◦ Identify all the main sources of direct and indirect greenhouse gas emissions applicable to each phase of the Project; ◦ Provide a list of technologies and practices to reduce greenhouse gas emissions for each emission source identified, particularly the technologies emerging at an advanced stage of technological development or that could become technically and economically feasible during any phase of the Project; ◦ Conceive a plan depending on the list of technologies and practices that are technically and economically feasible to deploy these technologies and practices over the course of the Project. The implementation plan will have to account for the time when the equipment must be replaced and provide for their replacement with equipment and practices that are less greenhouse gas-intensive. ◦ Establish greenhouse gas emissions reduction objectives at specific intervals, depending on the implementation plan. ◦ Identify all the obstacles, challenges and risks associated with the implementation of the plan and how the Proponent intends to overcome them. • Include eco-driving in the training for drivers and machinery operators; ◦ Apply driving tips and techniques that allow reduction of a vehicle's fuel consumption for the same service rendered, especially with regard to acceleration and deceleration; ◦ Document driver and operator participation in training. • Offer a shuttle service for the workers to reduce the number of vehicles on the site during the construction phase. Implement incentives for workers to use the shuttle service; • Limit the off-duty operation of any motorized equipment or vehicle, including when not in use or on standby for a period exceeding five minutes during all phases of the Project; • Use motorized equipment in good working order; ◦ Ensure the mufflers and catalytic converters (antipollution system) of the machinery are in good working order. • Implement measures to mitigate atmospheric emissions, including greenhouse gas emissions, particularly in: ◦ Evaluate pilot nozzle gas consumption when selecting flare equipment to improve energy efficiency; ◦ Using zero-emission equipment and vehicles. In the event that a particular piece of zero-emission equipment or vehicle is not available or not technically or economically feasible, the Proponent should provide justification to the Agency and use a diesel or low-carbon fuel equipment or vehicle that meets, at a minimum, Tier 4 emission standards; ◦ Requiring that operators of ships intended to supply liquefied natural gas use ships that satisfy the most stringent U.S. Environmental Protection Agency emissions standards in effect at the time the tankers will begin operating in Canadian waters. • Adopt primary measures to reduce methane losses (related to engine design and operation) or secondary measures, i.e., measures at the exhaust outlet. In doing so, capture evaporative gases from tankers for use in powering the vessels' main and auxiliary engines and provide vessels with reliquefaction units in case the power requirement is less than the evaporation rate; • Installing and maintaining a shore power connection during the operational phase so that any tanker capable of connecting to it can do so while at berth; • Use liquefied natural gas to power dual fuel generators during normal operations, unless it is not technically or economically feasible. If an alternative energy source is required, the Proponent shall submit a justification to the Agency prior to operation. **Follow-up and Follow-up Requirements** • Review and update the greenhouse gas management plan, in consultation with Environment and Climate Change Canada, after the fifth year following the start of construction and thereafter as determined at each review, but at a minimum every five years for the life of the Project, to adapt to the changes in circumstances and emerging technologies in order to further reduce greenhouse gas emissions. The update of the plan shall be done and shall include the following points: ◦ Provide the greenhouse gas emissions directly attributable to the Project produced over the past five years, as well as the methodology, the assumptions and all the supporting data, as follows: ▪ Emissions directly linked to the Project's operation; ▪ Emissions coming from construction and dismantling activities, transportation activities that are not directly linked to the Project's operation, and other types of indirect emissions attributable to the Project; ▪ These emissions must be estimated by the method set out in the Canada's Greenhouse Gas Reporting Quantification Requirements (Greenhouse Gas Reporting Program). If the methods for certain emission sources are not specified for an activity in Canada's Greenhouse Gas Quantification Requirements, it will be acceptable to use other methods compliant with the 2006 Intergovernmental Panel on Climate Change Guidelines for National Greenhouse Gas Inventories. The Proponent must clarify and justify the methodology used for quantification of the Project's greenhouse gas emissions. ◦ Provide a description of the activities undertaken or deployed to reduce greenhouse gas emissions over the past five years. If this description does not correspond to the projected activities, please provide a justification. • Update the list of technologies and practices to reduce greenhouse gas emissions, particularly emerging technologies at an advanced technological development stage that could become technically and economically feasible over the next few years, and the update of the implementation plan for technologies and practices to further reduce greenhouse gas emissions over the next few years and revise greenhouse gas projections accordingly.

Valued Component	Mitigation Measures, Monitoring and Follow-up
Marine Mammals, including St. Lawrence Beluga Whale	**Key Mitigation Measures** • Drilling with rotary heads and pile driving by vibration to minimize noise; • Develop and implement phased start-up procedures, gradually increasing the power of the drilling and pile-driving equipment, for drilling and pile-driving activities to allow marine mammals to move away from sources of underwater noise; • Develop, prior to the commencement of marine construction and in consultation with Fisheries and Oceans Canada, and implement measures to ensure that beluga whales (*Delphinapterus leucas*), harbour seals (*Phoca vitulina*) and fish are not exposed to levels of noise that may cause environmental effects on these species during construction in and around the marine environment, including mortality and behavioural effects. Establish, prior to marine construction, underwater noise thresholds above which beluga whales, harbour seals, and fish should not be exposed during construction in and near the marine environment. In establishing these thresholds, consider the work methods used, the underwater noise levels expected for each of the construction activities in and near the marine environment, and the times of the year during which these activities will occur. Notify the Agency, prior to marine construction, of these measures and the circumstances during which each exposure level is to be maintained and implement these measures throughout the duration of the marine construction unless otherwise authorized by Fisheries and Oceans Canada; • Develop, prior to the commencement of marine construction or in its vicinity and in consultation with Fisheries and Oceans Canada and interested First Nations, and implement throughout the marine construction phase a monitoring program for beluga and harbour seals. As part of the monitoring program: ◦ Install buoys to define marine mammal protection zones; ◦ Require observers, who are qualified marine mammal watchers, to conduct continuous visual surveillance of the protected areas during daylight hours and report to the Proponent the presence of beluga whales or harbour seals within their respective protected areas during each marine construction activity; ◦ Stop or postpone the start of marine construction activities if a beluga or harbour seal is observed in the marine mammal observer protection areas until the beluga or seal has exited the protection area and no beluga or harbour seal is observed in the protection area for a continuous period of at least 30 minutes; ◦ Do not bother or harass belugas or harbour seals in any way to make them leave the protected areas; ◦ Perform drilling and pile driving activities only during daylight hours and avoid low visibility conditions (including fog). • In order to limit collisions with marine mammals, maintain the speed of tankers and escort vessels below ten knots between Les Escoumins and the Project site and below 8 knots in the Grosse-Île sector (Île Saint-Louis), as long as the safety of the vessel and its crews is not compromised. In order to meet the need for an adaptive approach, this measure will have to be reviewed annually based on the results of the follow-ups, and the most recent scientific data acquired, in consultation with stakeholders and using existing work platforms; • Develop, prior to operation and in consultation with Fisheries and Oceans Canada, Parks Canada and Transport Canada, and implement, upon commencement of operation, a Marine Mammal Management Plan to maximize the mitigation of environmental effects of shipping associated with the Project caused by underwater noise and the risk of collisions with marine mammals. As part of the development of the plan, determine the frequency with which the plan will be reviewed and, if necessary, updated in consultation with Fisheries and Oceans Canada, Parks Canada and Transport Canada. As part of each plan review: ◦ Identify complementary underwater noise and collision risk reduction technologies and operational practices applicable to the Project, including emerging technologies and practices at a sufficiently advanced stage of technological development to become technically and economically feasible during the life of the Project; ◦ Determine how and when each identified technically and economically feasible technology or operational practice will be implemented during; ◦ Establish underwater noise and collision risk reduction goals, including noise thresholds in certain frequency bands not to be exceeded for the types of tankers associated with the Project, for specific intervals that reflect how the Proponent plans to implement the technologies and operational practices; ◦ Identify barriers, challenges, and risks associated with the implementation of technologies and operational practices and identify how to overcome them; ◦ Submit any revised plan to the Agency, Fisheries and Oceans Canada, Parks Canada and Transport Canada within 30 days of the update; ◦ Report annually on progress in implementing the current version of the Marine Mammal Management Plan, including the achievement of underwater noise and collision risk reduction targets. • Develop, in cooperation with Fisheries and Oceans Canada, Parks Canada and Transport Canada, and implement any economically viable time-allocation approach to minimize acoustic disturbance to marine mammals, provided that the safety of the vessel and its crew is never compromised; • Participate, at the request of the relevant authorities, in regional initiatives related to the monitoring, assessment or management of cumulative adverse effects on beluga whales associated with commercial vessel traffic on the Saguenay River, should such initiative(s) occur during the construction or operation of the Project. Implement any technically and economically feasible mitigation measures or follow-up programs identified through any of the regional initiatives described above that are under the responsibility of the Proponent. **Follow-up and Follow-up Requirements** • Develop a follow-up program prior to construction, in consultation with First Nations, Parks Canada, Transport Canada and Fisheries and Oceans Canada, to verify the accuracy of the environmental assessment and to assess the effectiveness of mitigation measures with respect to the environmental effects of the risk of collision with marine mammals. Implement the follow-up program during operation. As part of the follow-up program: ◦ Discuss, during program development, opportunities for First Nations to participate in the implementation of the program, including participation in marine mammal observations, and allow for the participation of any interested First Nations; ◦ Require observers, who are qualified marine mammal watchers and who are positioned on board the tankers associated with the Project, to conduct continuous visual monitoring of marine mammals during daytime navigation periods. • Develop, prior to the commencement of marine construction activities and in consultation with interested First Nations and Fisheries and Oceans Canada, 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 underwater noise on fish and marine mammals. Implement the follow-up program during construction and operation. As part of the implementation of the follow-up program: ◦ Conduct real-time monitoring of underwater noise levels from drilling and pile driving activities during the first 14 days of construction to validate the results of acoustic simulations performed for these activities during the environmental assessment and adjust the exclusion zone distance or mitigation measures, if necessary. Determine, in consultation with parties consulted in the development of the follow-up program and based on the results of the monitoring, whether additional monitoring is required beyond the first 14 days of construction. If additional monitoring is required, update the monitoring program and implement the additional monitoring program requirements; ◦ Carry out a follow-up of the underwater noise levels emitted by the docking and loading operations as well as those related to the transportation of liquefied natural gas during the operational phase of the Project at the marine infrastructure site. The monitoring will have to evaluate the underwater noise during the entire period required to dock and load a vessel;

Valued Component	Mitigation Measures, Monitoring and Follow-up
	• Carry out a follow-up of the underwater noise levels related to the transportation of liquefied natural gas, including tankers and tugs, during the operational phase of the Project. The follow-up will have to allow the evaluation of the underwater noise for different conditions, in particular during the descent and ascent of the Saguenay River. It should also cover the St. Lawrence Estuary. The monitoring will have to target beluga, harbour seals and endangered whales. The monitoring should make it possible to measure the noise actually generated by the vessels and the exposure of the mammals to the noise, taking into account their use of the various habitats (feeding, breeding, etc.) in the affected sector and their level of loyalty to them. Should the results of the follow-up show that the underwater noise emitted by navigation exceeds the forecasts presented in the impact study, the Proponent shall adapt, navigation in order to minimize the effects on the species according to methods that could be identified in collaboration with the competent authorities and the First Nations who will demonstrate their interest.

Fish and Fish Habitat, Including Invertebrates, Species at Risk and Marine Plants	**Key Mitigation Measures**
	
	<u>Fish-Specific Measures</u>
	• Carry out the construction work outside the existing restriction periods for fish (unless authorized by Fisheries and Oceans Canada to carry out work outside these periods):
	  ○ Conduct work in fish habitat between October 10 and May 31;
	  ○ Conduct work between sunrise and sunset, between June 1 and October 5, inclusively.
	• In the loading platforms sector, do not project any light directly at the water and use a low lighting level in the sector, rapidly falling to less than 0.5 lux at a distance of approximately 150 metres offshore, which should not disturb the aquatic species that frequent the sector, more specifically in migration periods (spring and fall);
	• Develop, to the satisfaction of Fisheries and Oceans Canada and in consultation with willing First Nations, and implement a pre-construction compensation plan for fish and fish habitat and loss of aquatic vegetation and intertidal meadows:
	  ○ Submit the compensation plan approved by Fisheries and Oceans Canada to the Agency prior to implementation;
	  ○ Discuss, prior to the implementation of the compensation plan, with willing First Nations the opportunities for their involvement in the implementation of the compensation plan, and allow for their participation in the implementation.
	• For any fish habitat compensation measures proposed in any compensation plan that may result in adverse environmental effects that were not considered in the environmental assessment, develop and implement, in consultation with willing First Nations and appropriate authorities, measures to mitigate those effects. Submit these measures to the Agency prior to their implementation;
	• Implement measures to mitigate noise disturbance in an aquatic environment attributed to the Project, in addition to those presented in section 5.2:
	  ○ Trigger small scare loads to deter fish prior to the start of work that may cause acoustic disturbance;
	  ○ Start drilling and pile-driving operations in a gradual and continuous manner over a period of 20-30 minutes to allow fish to move away from the work area prior to reaching maximum sound intensity;
	  ○ Provide noise abatement measures in the event of significant and recurring dead or injured fish within the work area (indicative of high underwater noise levels for noise-sensitive aquatic organisms);
	  ○ Prohibit the detonation of explosives in or near fish habitat that produce or may produce an instantaneous pressure change greater than 30 kPa in a fish swim bladder.
	
	<u>Specific Measures for Work in the Aquatic environment and for Sediment Management</u>
	• Do not dispose of any spoil, waste or debris below the high water mark of high tide, including the installation of containment devices, and immediately remove any spoil, waste or debris deposited in this area. Contain or stabilize unconsolidated excavated material to prevent the release of sediment into the aquatic environment;
	• Limit construction activities involving the use of machinery operating from the intertidal zone;
	• Perform as much work as possible in the littoral zone from barges equipped with a crane or by means of a barge with anchor piles (jack-up barge), so as to minimize traffic in the intertidal and riparian zone. In the event of the necessity of resorting to machinery circulating in the intertidal zone, convert the equipment to vegetable-based hydraulic oil;
	• For equipment on barges during construction of marine infrastructure, install a retention pond to avoid spills in the aquatic environment;
	• For work carried out above the high water mark, implement effective measures to limit the input of sediments from the construction site into the aquatic environment and ensure their maintenance (for example, sediment barrier, berms, sediment trap, sedimentation basin, temporary stabilization of embankments, diversion of water to vegetated areas). The measures must remain effective during temporary closure of the site and during periods of flooding or heavy rainfall;
	• Perform close monitoring during the excavation and profiling work to detect any possibility of detaching. In case of doubt, deploy corrective measures to avoid any slippage;
	• When placing piles, collect and dispose of drilling mud on land;
	• Decant the pumped water before returning it to the water body;
	• Perform the concreting work according to appropriate work methods allowing circumscription of the work area and avoidance of the flow of concrete residues into the water;
	• Do not refuel any ships from the loading platforms;
	• Do not discharge any debris into the aquatic environment. All accidentally introduced debris should be removed as soon as possible;
	
	<u>Measures Specific to Surface Water and Groundwater Management</u>
	• Visually delineate the work area to minimize the footprint in watercourses;
	• Maintain, during operation, a vegetated riparian buffer strip, at least 15 metres wide, along the natural high water mark of water bodies, along any water body, wetland or access road, except for the locations of components required for the Project (including erosion and sedimentation control measures). Conduct work or activities within the vegetated riparian buffer only if necessary for safety reasons or to implement and maintain any component of the Project:
	  ○ Ensure that any employee or contractor associated with the Project who is required to remove a tree greater than 150 millimetres in diameter located within the vegetated buffer strip obtains authorization from the site manager prior to removal.
	• Divert runoff to a vegetated area at least 30 metres from the watercourse or intercept runoff with sediment barriers or a sedimentation basin;
	• Maintain undisturbed vegetation along watercourses, wetlands and access roads. For the removal of a tree larger than 150 millimetres in diameter, obtain authorization from the Project manager's environmental officer prior to the work;
	• To prevent the release of suspended solids into the environment, apply dust suppressants as required on surfaces where traffic may cause dust to be raised during the work. The dust suppressant used shall comply with NQ 2410-300;
	• Prohibit fording crossings. Restrict machinery and truck traffic to the right-of-way of access roads and work areas;
	• Restore, progressively, riparian strips disturbed by the construction work by using species indigenous to the Saguenay and to this type of environment to reproduce the natural shoreline of the watercourse or water body. Restoration should be done as the work is completed;

Valued Component	Mitigation Measures, Monitoring and Follow-up
	• Avoid work near watercourses during heavy rainfall; • Implement effective measures to limit the dispersion of suspended sediments in the aquatic environment and ensure their proper functioning. Measures should be put in place to limit fish entrapment; • During the works, respect the natural drainage of the environment and take all appropriate measures to allow the normal flow of water; • When preparing the land at the plant site, ensure that the soil is levelled to allow runoff water to reach a temporary sedimentation basin. Implement appropriate treatments to reduce concentrations of suspended solids and hydrocarbons prior to their return to the water environment; • When constructing ditches or drainage works, reduce the slope of the ditch if necessary by installing obstacles at regular intervals that will prevent erosion by reducing velocity while filtering particles (sandbags, straw bales, etc.). Divert water to a vegetated area outside the right-of-way or capture water within the existing drainage system. If necessary, construct a sedimentation basin outside this strip to capture runoff and transported sediments. This should be sized according to the flow to be received and discharged. Consider periods of high water, heavy rainfall and freezing temperatures when operating these mechanisms and maintain them on a regular basis. The Proponent shall repair any damaged mechanisms as soon as technically feasible; • Implement a drainage system during construction and operation consisting of temporary and permanent stormwater collection, control, and treatment structures that respect natural watershed boundaries and limits the increase in peak flooding from pre-existing natural conditions to mitigate environmental effects on fish and fish habitat. In doing so: ◦ Establishing control points at all locations where water that has been in contact with infrastructure associated with the Project is released to the aquatic environment; ◦ Ensuring that runoff from natural slopes does not enter the contact waters; ◦ Construct the liquefaction plant pad in such a way as to allow for the recovery, independently of the external stormwater system, of suspended solids and any contaminants that have the potential to leak in liquid form to the aquatic receiving environment; ◦ Submit to the Agency, prior to construction, the location of all temporary and permanent structures associated with the drainage system that takes into account the final engineering of the Project. For work required for construction, indicate the planned works as construction progress. • Maintain the hydraulic connection between unnamed lake #2 and the downstream section of stream CE-03; • When necessary, direct water from the basin used for rinsing concrete mixers, pumps and other concrete tools to the concrete plant located on the Saguenay Port Authority property, where it will be treated by the plant's water treatment system. Carry out the routing of rinsing water under constant supervision; • Carry out concreting work using work methods that limit the work area and avoid the discharge of concrete residues into the natural environment; • Prohibit the refuelling of ships with hydrocarbons from loading platforms or other infrastructure on the Project site; • Discharge water from liquefied natural gas tank leak tests into a retention basin designed to have the capacity to store and adapt the discharge rate to the transit capacity of the natural ditch. Adjust the effluent flow rate using a control device to be installed at the outlet of the retention basin; • Take measures to ensure that the sampling rate during leakage tests does not affect the environment at the water intake so as not to affect the physicochemical parameters of the water; • Use abrasives (sand and gravel) instead of de-icing agents in winter, and water as a dust cover. If a dust suppressant is to be used, the product chosen must comply with provincial standard NQ 2410-300 and the product must not be disposed of or rinsed off the equipment in or near a ditch, watercourse or on vegetation; • Prohibit the discharge of snow into a watercourse and within the 30-metre strip of a watercourse. In the event of the installation of a storage area for cleared snow, it must be located at a minimum distance of 30 metres from any watercourse; • Store hazardous materials and noxious substances in watertight containers or tanks and in retention basins, bins or berms with a capacity of 110% of the containers stored, at all temporary or permanent storage sites, including on self-elevating platforms ("barges"); • Park and wash machinery and equipment more than 60 metres from any watercourse, including the Saguenay River, or body of water and outside of any wetland; • Refuel any vehicle or equipment off-site, unless it is not technically or economically feasible. If refuelling must be done inside the site, it must be at least 60 metres from any body of water (including the Saguenay River) by constantly monitoring the refuelling and avoiding any dripping on the ground; • Maintain any vehicle or equipment off-site and according to the manufacturer's specifications to keep it in good working order. Inspect any vehicle or equipment periodically to prevent petroleum products leakage and document the results of any inspection; • For shoreline blasting, use a type of explosive designed for use in wet or damp areas. Blasting should be carried out in accordance with good practice to limit fracturing of rock and disruption of the groundwater flow system; <u>Specific Measures for Soil Management</u> • Adhere to the principle of non-degradation of soils in any movement of soils as part of the Project. Consider local ambient soil concentrations and do not increase contaminant concentrations in soils, even if they are below the thresholds included in the Canadian Council of Ministers of the Environment's Canadian Soil Quality Guidelines. Do not approach soils with concentrations of a substance above background levels in an aquatic environment. • Conduct a pre-construction and pre-operational environmental soil quality characterization in any section of the limited study area where the Proponent believes that activities that may have contaminated soils have previously occurred. If the results of the characterization demonstrate that soils have been contaminated in a given area, remediate the soils prior to undertaking any project-related activities in that area. **Follow-up and Follow-up Requirements** • Develop, before construction and in consultation with Fisheries and Oceans Canada, Environment and Climate Change Canada and the First Nations who wish it, a follow-up program to verify the accuracy of the environmental assessment and judge the efficacy of the mitigation measures relating to the environmental effects of the Project on fish and fish habitat. Implement this program during construction and for at least five years after the end of construction. In the context of implementing the follow-up program: ◦ Monitor, visually, aquatic work areas during construction on a daily basis for the presence of dead or injured fish; ◦ Monitor, during construction and for at least five years following completion of construction, the use of the water bodies and littoral zone of the limited study area by the various fish species; ◦ Develop and implement modified or additional mitigation measures if the results of the monitoring show that modified or additional mitigation measures are necessary to mitigate the adverse environmental effects on the fish and fish habitat; ◦ Before the end of the fifth year after the end of construction, determine, in consultation with the parties consulted during the development of the follow-up program and according to the results of the monitoring, if additional monitoring is required.

Valued Component	Mitigation Measures, Monitoring and Follow-up
	If additional monitoring is required, update the follow-up program and implement the additional requirements of the follow-up program. • Develop, before construction and in consultation with Fisheries and Oceans Canada, Environment and Climate Change Canada and the First Nations who wish it, a follow-up program to determine the effects of the activities and the changes incurred on the grass beds, particularly regarding hydrosedimentary dynamics. Implement the follow-up program at the beginning of the marine terminal operation phase and for at least the next five years. In the context of the implementation of the follow-up program, the Proponent shall : ◦ Survey, at least annually and during the optimum growth period of the vegetation (generally the month of August), the contour of grass beds H1, H2 and H3, as well as another small grass bed present in the neighbouring zone, with the DGPS[109] to allow a ruling on the changes in the area, density and composition of the grass beds; ◦ Inventory, within the parcels, the number of stems per surface unit with the goal of determining the density of the stems and the diversity of the species present there. The number of parcels will be defined according to the area of each of the grass beds and their homogeneity; ◦ Develop and implement modified or additional mitigation measures if the results of the follow-up show that modified or additional mitigation measures are necessary to mitigate the adverse environmental effects on the submerged grass beds; ◦ Before the end of the fifth year of the program, determine, in consultation with the parties consulted during the development of the follow-up program and according to the results of the monitoring, if additional monitoring is required. If additional monitoring is required, update the follow-up program and implement the additional requirements of the follow-up program. • Develop, before construction and in consultation with Fisheries and Oceans Canada, Environment and Climate Change Canada and the First Nations who wish it, a follow-up program to assess the recovery and use of the environment by benthic fauna, but also note the changes within the benthic community. Implement the follow-up program at the beginning of the marine terminal operation phase and for at least three follow-ups (in Appendices 1, 3 and 5). In the context of the implementation of the follow-up program: ◦ Deploy a follow-up system with the markers implanted in the rock. Thus, from the baseline, georeferenced metal marks can be deployed by drilling. These markers, positioned every five metres of depth (between 25 and 10 metres deep), to identify the inventory stations and transects where monitoring will take place; ◦ Produce five transects by diving, composed of four stations each so that the entire zone neighbouring the marine terminal is well covered. They must be filmed; ◦ Develop and implement modified or additional mitigation measures if monitoring results demonstrate that modified or additional mitigation measures are needed to mitigate adverse environmental effects on submerged seagrass beds; ◦ Prior to the end of the fifth year of the program, determine, in consultation with parties consulted in the development of the follow-up program, and based on the results of the monitoring, whether additional monitoring is required. If additional monitoring is required, update the monitoring program and implement the additional monitoring program requirements. • Do daily visual monitoring of the work area to detect the presence of dead or injured fish. Develop and implement modified or additional mitigation measures if the results of the monitoring show that modified or additional mitigation measures are necessary to mitigate the adverse environmental effects on fish; • Develop, prior to construction and in consultation with Fisheries and Oceans Canada, a follow-up program to verify the accuracy of the environmental assessment of the potential introduction of aquatic invasive species from ballast water. Implement the follow-up program from the start of the marine terminal operation phase. As part of the implementation of the monitoring program: ◦ Develop and implement a system at the terminal structures to detect the arrival of a new species as soon as possible; ◦ Develop and implement modified or additional mitigation measures if monitoring results demonstrate that modified or additional mitigation measures are required to mitigate adverse environmental effects where appropriate. • Develop, prior to construction and in consultation with Fisheries and Oceans Canada, a sound pressure monitoring program to ensure that the work does not result in fish mortality or injury (section 5.2); • Develop, prior to construction and in consultation with Environment and Climate Change Canada, and implement, upon commencement of construction, a follow-up program to verify the accuracy of the environmental assessment and to assess the effectiveness of mitigation measures with respect to the environmental effects of changes in surface water quality. As part of the development of the follow-up program, identify the quality criteria against which the suspended solids and pH measured in the follow-up program will be compared and which may require the implementation of modified or additional mitigation measures. As part of the implementation of the monitoring program: ◦ Monitor water volumes transferred as part of the natural gas tank leak testing; ◦ Monitor the quality of stormwater discharged at all outfalls, including the retention pond outfalls for Industrial Plat 2, 3, and 4 shown on Map 2-11 submitted in response to the Second Information Request (WSP, December 2020). Include chlorides, calcium, sodium, iron, lead, cadmium, copper, chromium, and zinc and conduct monitoring for each compound at least monthly, during the product use seasons that contain each of these compounds; ◦ Develop and implement modified or additional mitigation measures if monitoring results demonstrate that modified or additional mitigation measures are required to mitigate the environmental effects of changes to surface water quality. • Develop, prior to construction and in consultation with Environment and Climate Change Canada, a follow-up program to verify the adequacy of the environmental assessment and to assess the effectiveness of mitigation measures with respect to the environmental effects of changes to groundwater quality. Implement the follow-up program no later than one year after the start of construction and continue the implementation of the follow-up program at least annually during operation and closure. As part of the implementation of the follow-up program: ◦ Monitor groundwater quality in the restricted study area, including from at least one observation well located between the south of the industrial pad and the southern boundary of the restricted study area and at least one observation well located between the retention pond for industrial pad 3 and the eastern boundary of the restricted study area. Include sodium, calcium, and ammonia nitrogen ions in the compounds it monitors for groundwater quality; ◦ Develop and implement modified or supplemental mitigation measures if monitoring results demonstrate that modified or supplemental mitigation measures are necessary to mitigate the environmental effects of changes to groundwater quality.
Vegetation and Wetlands	**Key Mitigation Measures** • Optimize the Project to minimize the footprint of the infrastructure (access roads) and the plant (plant, miscellaneous buildings), avoid important habitats (wetlands), reduce encroachment on wetlands and terrestrial and riparian vegetation, and avoid fragmenting these habitats wherever possible; • Before construction begins, mark off the proposed earthworks and accesses, and identify the deforestation and soil stripping areas and the clearcutting areas so as to minimize the areas to be cleared. Prohibit machinery and vehicles outside those areas; • Restore, progressively, disturbed vegetated areas by uniformly revegetating work areas, disused access roads, constructed embankments, bare surfaces, and riparian buffers as construction is completed in these areas with deciduous and coniferous species that are native to the area and adapted to the surrounding environment to achieve a vegetation composition and abundance comparable to that of adjacent areas;

[109] Differential Global Positioning System

Valued Component	Mitigation Measures, Monitoring and Follow-up
	• Carry out work in wetlands on frozen ground or during periods of low water levels; • Maintain drainage conditions in wetlands adjacent to the work areas; • Require contractors to clean all construction machinery prior to arrival at the work site. The purpose of this cleanup is to completely remove soil, organic matter, plant fragments and visible debris and to prevent the spread of invasive alien species; • Clean excavating machinery if it is used in areas affected by invasive alien plant species, before it is used again in unaffected areas. Perform the cleaning in areas unsuitable for seed germination, i.e., at least 50 metres from watercourses, water bodies, wetlands and threatened or vulnerable species. Dispose of the waste resulting from the cleaning; • In the event that compensation under the Government of Quebec's *Environment Quality Act* is developed through a compensation plan developed by the Proponent, consult with the Agency, Environment and Climate Change Canada and First Nations to ensure that their concerns are addressed in the plan. Discuss with each First Nation the opportunities for their participation in the implementation of the plan. Prior to the submission of the final compensation plan to MELCC, inform Environment and Climate Change Canada and First Nations about how their views and information were considered in the development of the plan, including the rationale for why the views and information were, or were not, incorporated into the compensation plan. **Follow-up and Follow-up Requirements** • Develop, prior to construction and in consultation with Environment and Climate Change Canada and willing First Nations, a follow-up program to verify the accuracy of the wetland environmental assessment. Implement the follow-up program from the beginning of the construction phase of the marine terminal and for at least the first five years of the phase. As part of the implementation of the follow-up program, include wetlands adjacent to those that would be temporarily or permanently encroached upon, to ensure that the planned protection measures are effective, and to verify the presence of indirect effects on wetlands related to interconnections between them; • Develop, prior to construction and in consultation with Environment and Climate Change Canada and willing First Nations, a revegetation monitoring program for all revegetation and planting work performed. Implement the follow-up program two years following construction according to pre-established measures to verify the success of the vegetation establishment and the absence of invasive alien species in the newly vegetated areas.
Birds, Including Species at Risk, and Their Habitats	**Key Mitigation Measures** • Carry out for each phase of the Project in a manner that protects migratory birds and avoids injuring, killing, or disturbing them, or destroying, disturbing, or taking their nests or eggs, in particular, from mid-April to early September. For this purpose, the Proponent shall respect Environment and Climate Change Canada's Avoidance Guidelines to reduce the risk to migratory birds. In carrying out the Project, implement measures that comply with the *Migratory Birds Convention Act, 1994*, the *Migratory Birds Regulations*, and the *Species at Risk Act*; • Not to undertake any activities associated with the construction or operational phases of the Project that would interfere with the nesting of birds (including migratory birds and birds that are listed species at risk) so as to prevent the destruction of nests, eggs, or chicks. In doing so: ◦ Determine nesting season periods, in consultation with Environment and Climate Change Canada, for any year in which project-related activities that may affect nesting birds; ◦ If it is not technically or economically feasible to carry out an activity that may disturb nesting outside of the nesting season in a given year, submit a justification to the Agency and develop and implement, in consultation with Environment and Climate Change Canada, additional mitigation measures to prevent adverse effects on birds during nesting, which includes their nests, eggs, and chicks. Submit these measures to the Agency prior to implementation. • Implement measures in all phases of the Project to mitigate noise and vibration attributed to it (these measures are also included in other sections of the report, including sections 5.1, 5.9 and 5.10): ◦ Promote the use of white noise back-up alarms; ◦ Carry out any major construction activity that may generate noise (including blasting activities and activities requiring the use of heavy equipment, off-road trucks, drills, crushing equipment, generators, compressors and activities that generate impulsive noise) during the day (7:00 a.m. to 7:00 p.m.) Monday to Friday; ◦ Reduce and maintain the speed limit to no more than 24 kilometres per hour. Provide signs to indicate speed limits; ◦ Use material unloading techniques that minimize truck rear panel slamming during unloading. • Implement mitigation measures during construction and operation that comply with the Bureau de Normalisation du Québec Standard 4930-100 entitled Outdoor Lighting - Control of Light Pollution in relation to the amount of light emitted, its orientation, spectral composition and duration of use of the lighting fixtures used in order to mitigate the environmental effects of the Project caused by the emission of light, while respecting operational requirements for health and safety. These measures include: ◦ Reduce light spill into the sky and water by using fixtures that produce dim, uniform illumination that meets actual lighting needs, and direct light only onto surfaces that needs to be lit; ◦ Ensure that the fixtures do not give off light at angles greater than 90 degrees, and install fixed lights to avoid light spill out of the spaces to be lit; ◦ Control the time period and duration of lighting use by installing timers and motion detectors, and by encouraging workers to turn off lights. Plan lighting to ensure that it is at optimal levels for worker and equipment safety while also minimizing light output. Turn off light sources in areas where lighting is not required at all times; ◦ Install outdoor lighting fixtures that minimize sources of ultraviolet, red and white light and have a correlated colour temperature between 1800 and 3000 Kelvin; • Implement an employee awareness and training program. Make workers aware of the presence of migratory bird nests or bird that is a species at risk and what to do if a nest is discovered. **Follow-up and Follow-up Requirements** • Develop, prior to construction and in consultation with Environment and Climate Change Canada and First Nations who wish to do so, the final and consolidated version of the monitoring program for birds (including species at risk). This program will have to identify, among other things, the activities or operations that are likely to have an effect on species at risk and, for each of these, determine the measures to be implemented to reduce nuisance or disturbance. The program will need to be updated periodically to take into account changes in regulations, such as the review of the status of wildlife species by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) or the Species at Risk Act. Implement additional mitigation measures if required. The program shall assess the contribution of the Project to cumulative effects by taking into account, to the extent possible, any available external data, including data from other projects in the region; • Prior to construction and in consultation with Environment and Climate Change Canada and interested First Nations, develop a follow-up program for birds (including migratory birds and birds that are listed species at risk) that frequent the study area to validate whether species at risk are present and using the area around it. Implement this program during operations and closure. Conduct initial follow-up prior to the start of construction (year 0 – reference year), during the first year of operation, and then every five years for the entire operation and closure period (years 6, 11, 16, 21, etc.). In implementing the follow-up program, the Proponent shall:

Valued Component	Mitigation Measures, Monitoring and Follow-up
	◦ Devise an inventory plan based on the potential habitats of the various target species available around the infrastructure. Target species are those that have been inventoried or for which potential habitat is available in the study area: ▪ Conduct a daytime field inventory using listening points for Evening Grosbeak, Canada Warbler, Eastern Wood-pewee, Rusty Blackbird, and Barn Swallow; ▪ Conduct an evening field inventory in June for the Common Nighthawk and the Eastern Whip-poor-will; ◦ Forward follow-up reports to the Agency, Environment and Climate Change Canada, and First Nations. Follow-up reports should contain the following elements: results, analysis of results, and contingency measures; ◦ Develop and implement modified or additional mitigation measures if follow-up results demonstrate that such measures are required to mitigate the environmental effects of the Project on birds, their eggs, and their nests; ◦ Assess the contribution of the Project to cumulative effects by considering, to the extent possible, any available external data, including that from other projects in the region. • Prior to the operational phase and in consultation with Environment and Climate Change Canada, develop a follow-up program to specifically address the effect of ground flares on avian wildlife, and implement the program during the operational phase on birds (including migratory birds and birds that are listed species at risk). Conduct follow-ups during the spring migration period (between the end of March and the end of May) and the fall migration period (beginning of September and beginning of November), once a week for approximately seven weeks per season, starting in the first year of flare use. In implementing the follow-up program, the Proponent shall : ◦ Forward follow-up reports to the Agency, Environment and Climate Change Canada, and First Nations; ◦ In the event of emergency use of flares at night, visit the site to check for the presence of dead birds on the ground. If any are found, identify and count them; ◦ Develop and implement modified or additional mitigation measures if follow-up results demonstrate that such measures are required to mitigate the effects of flares on birds; ◦ Prior to the end of the first year of operation, determine, in consultation with the parties consulted in the development of the follow-up program and based on the results of the monitoring, whether additional monitoring is required for a subsequent year. If additional monitoring is required, update the monitoring program and implement the additional monitoring program requirements. • Prior to construction and in consultation with Environment and Climate Change Canada and interested First Nations, develop and implement a follow-up program during construction and operation to assess the effect of noise on use of the area by nesting birds. Monitor at least twice a year during the nesting season. Monitoring should begin half an hour before sunrise and last for a maximum of five hours. As part of the implementation of the monitoring program: ◦ Determine the number and placement of sampling stations in order to assess the potential loss of peripheral habitat associated with ambient noise. Position the stations according to the final site plan and according to the expected noise propagation models; ◦ Begin monitoring during the nesting period prior to the start of construction; ◦ Ensure that the selected mornings meet the optimal weather conditions for such an inventory: low or no lower wind and no or low precipitation (less than 3 millimeters); ◦ Develop and implement modified or additional mitigation measures if monitoring results demonstrate that they are necessary to mitigate the environmental effects of project noise on breeding birds; ◦ Assess the contribution of the Project to cumulative effects by considering, to the extent possible, any available external data, including that from other projects in the region; ◦ Forward follow-up reports to the Agency, Environment and Climate Change Canada, and First Nations
Terrestrial Fauna at Risk	**Key Mitigation Measures** • Not undertake any activities associated with the construction or operation of the Project that would interfere with the denning and suckling periods of juvenile bats, which is the period from June 1 to July 31 inclusive of each year. If it is not technically or economically feasible to carry out any activities that may affect the denning and suckling periods outside of this period in any given year, submit a justification to the Agency and develop, to the satisfaction of Environment and Climate Change Canada, and implement additional mitigation measures to avoid adverse effects on bats; • Install, prior to construction and in consultation with First Nations, artificial bat roosts at least one kilometre away from areas where construction activities will take place. Maintain the roosts throughout the life of the Project. Have the roosts installed by a qualified person; • Participate, at the request of the relevant authorities and in consultation with willing First Nations, in regional initiatives or any Saguenay Port Authority initiative related to the monitoring, assessment or management of cumulative adverse effects on terrestrial wildlife, including birds (see section 5.5 of this report) and bats, in the event that such initiative(s) are undertaken during the construction or operation of the Project Implement any technically and economically feasible mitigation measures or follow-up programs identified through any regional initiatives that are the responsibility of the Proponent. **Follow-up and Follow-up Requirements** • Develop, prior to construction and in consultation with Environment and Climate Change Canada and willing First Nations, the final and consolidated monitoring program for terrestrial wildlife at risk. This program shall identify activities or operations that may affect species at risk and, for each activity or operation, the measures to be implemented to ensure that disturbance is reduced. The program shall be updated periodically to take into account changes in regulations, such as the review of the status of wildlife species by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) or the Species at Risk Act. The program shall provide for the implementation of additional mitigation measures as necessary; • Before construction, develop a follow-up program in consultation Environment and Climate Change Canada and willing First Nations, to verify the accuracy of the environmental assessment and to determine the effectiveness of the mitigation measures related to the Project's adverse environmental effects on the northern myotis, the little brown myotis and the tri-colored bat and herpetofauna. In particular, the program must identify additional mitigation measures or compensation measures in the event that the measures taken prove ineffective. Implement the follow-up program during construction and during, at least, the first three years of operation. In implementing the follow-up program: ◦ Follow-up on the effect of noise and nighttime light (intrusive light) on bats' use of the area. This follow-up must be carried out during the bat breeding period. Carry out acoustic follow-up four times a year during this period, i.e., two visits in June and two visits in July, in the evening starting at dusk, ideally two weeks apart; ◦ Monitor the use of the artificial dormitories by bats; ◦ Carry out a herpetofauna follow-up after the completion of reconfiguration work on watercourse CE-03. Water quality readings must be taken four times a year to assess potential impacts on the aquatic components of the herpetofauna. A reference state must be carried out before the construction phase and would continue one year after the end of the work; ◦ Submit the follow-up report to the Innu First Nations of the Essipiunnuat, the Pekuakamiulnuatsh, the Pessamiulnutsh, and the Huron-Wendat Nation, the Agency and Environment and Climate Change Canada; ◦ Prior to the end of the third year of operation, determine, in consultation with parties consulted in the development of the follow-up program and based on the results of the monitoring, whether additional monitoring is required for bats during operation. If additional monitoring is required, update the monitoring program and implement the additional monitoring program requirements;

Valued Component	Mitigation Measures, Monitoring and Follow-up
	○ Assess the Project's contribution to cumulative effects by considering, to the extent possible, any available external data, including that from other projects in the region.
Current Use of Lands and Resources for Traditional Purposes	**Key Mitigation Measures** • Implement key mitigation measures regarding ○ fish habitat protection, as outlined in Section 5.3.2; ○ physical and cultural heritage, as outlined in Section 5.8.2; ○ socioeconomic conditions, as outlined in Section 5.9.2; ○ marine mammals, as outlined in Section 5.2.2; ○ birds, as outlined in Section 5.5.2; ○ accidents and malfunctions, as outlined in Section 6.1.2. • Consult and involve the Innu First Nations, the Huron-Wendat Nation and the Wolastoqiyik Wahsipekuk First Nation, according to their interests, in determining and implementing compensation measures for these components; • Communicate Project's activities schedules, changes and updates to the First Nations as soon as the Proponent submits the information to the Agency. **Follow-up and Follow-up Requirements** • With the First Nations that so desire, establish periodic follow-up concerning the design, implementation and evolution of the environmental follow-up program. The follow-up shall include meetings tailored and planned to address the interests and concerns of the First Nations involved in order to discuss the potential effects that may be related to the Project; • Before construction, develop a traditional activity follow-up program in consultation with First Nations to verify the accuracy of the environmental assessment and to gauge the effectiveness of the mitigation measures addressing adverse environmental effects on the current use of lands and resources for traditional purposes. The Proponent shall determine with each First Nation which activities require follow-up. The Proponent shall consider any additional information that may arise during the life of the Project. In particular, the Proponent shall establish specific follow-up for the effects of marine transportation on the activities of these First Nations, including users' perceptions (including the perception of security risk).
Physical and Cultural Heritage	**Key Mitigation Measures** • Choose materials and colours that harmonize with the natural environment of the areas adjacent to the Project and use matte finish paint with low levels of reflectance; • Revegetate, in a uniform manner, disused access roads, work areas, constructed slopes and stripped surfaces as the construction work is completed so as to achieve a composition and abundance of vegetation comparable to that found in the areas adjacent to the Project. To do so, use native deciduous and coniferous species that are adapted to the surrounding environment; • Prior to any archaeological intervention on federal lands, initiate discussions with the Administration portuaire du Saguenay and the Innu First Nations of the Essipiunnuat, the Pekuakamiulnuatsh and the Pessamiulnutsh, and the Huron-Wendat Nation regarding the long-term conservation of archaeological data produced and artifacts that may be discovered during fieldwork. The deposit and conservation of data and artifacts resulting from archaeological work on the lands of other jurisdictions is the responsibility of the Ministère de la Culture et des Communications du Quebec; • Have a qualified archaeologist conduct an archaeological inventory in areas of archaeological potential A2, B1, B2 and D1, in consultation with the appropriate authorities and the Innu First Nations of the Essipiunnuat, the Pekuakamiulnuatsh and the Pessamiulnutsh, and the Huron-Wendat Nation. In doing so, the Proponent must : ○ Consult, prior to the commencement of the inventory, with each of the First Nations on their interests and opportunities for participation in the conduct of the inventory, including the conduct of the field inventory and the evaluation of the inventory results; ○ Complete the report on the results of the inventory consultation with the First Nations and submit the final report to the Agency and the First Nations within 30 days of its completion; • If any structure, site or thing that is of historical, archaeological, paleontological or architectural significance is discovered by the archaeologist during the archaeological inventory or is reported to the Proponent by the Innu First Nations of the Essipiunnuat, the Pekuakamiulnuatsh and the Pessamiulnutsh, the Huron-Wendat Nation, the Proponent must: ○ Notify the Agency and the First Nations, the manager of the federal land or the Ministère de la Culture et des Communications du Quebec within 24 hours of the discovery and allow the First Nations to monitor the archaeological work; ○ To comply with all applicable legislative or legal requirements and related regulations and protocols respecting the recording, protection, transfer and safeguarding of structures, sites or things of historical, archaeological, paleontological or architectural significance, including regulations and protocols applicable to structures, sites or things of historical, archaeological, paleontological or architectural significance found on federal lands; • If a historically, archaeologically, paleontologically or architecturally significant structure, site or thing is discovered by the archaeologist or reported to the archaeologist by the Essipiunnuat Innu First Nations, the Pekuakamiulnuatsh, the Pessamiulnutsh, the Huron-Wendat Nation or other parties during construction or archaeological monitoring of the work, the Proponent shall : ○ Immediately stop the work on the site of the discovery; ○ Delineate an area of at least 30 metres radius around the discovery in which work is prohibited. The work ban does not apply to actions necessary to protect the integrity of the discovery; ○ Assign a qualified person, who is a professional archaeologist, the responsibility to conduct an assessment at the site of the discovery and to implement mitigation measures to ensure the protection and safeguarding of the discovery; ○ Notify the Agency, the First Nations, the manager of the Commissioner's Land or the Ministère de la Culture et des Communications du Québec within 24 hours of the discovery and allow for First Nations monitoring of the archaeological work; • Comply with all applicable legislative or legal requirements and related regulations and protocols regarding the recording, protection, transfer and safeguarding of structures, sites or things of historical, archaeological, paleontological or architectural significance, including regulations and protocols applicable to structures, sites or things of historical, archaeological, paleontological or architectural significance found on Crown land; • Include archaeological monitoring by a full-time professional archaeologist in the field during any excavation on the land portion of the Project on federal lands; • Provide for the services of a qualified third party professional archaeologist to independently observe and record the implementation of any archaeological interventions carried out by the Proponent as part of the Project; • Discuss with the Innu First Nations the implementation of initiatives related to the development of knowledge on the social and cultural importance of the beluga whale to their First Nations.

Valued Component	Mitigation Measures, Monitoring and Follow-up
	Follow-up and Follow-up Requirements ◦ Develop, in consultation with the Innu First Nations of the Essipiunnuat, the Pekuakamiulnuatsh, the Pessamiulnutsh, as well as the Huron-Wendat Nation, the competent authorities and potentially affected parties, and implement a follow-up program in order to validate the assessment of the effect of the Project on the visual environment. The follow-up will have to be carried out during the construction phase and the operation phase of the Project. In doing so, the Proponent shall : ◦ Monitor, at least annually during operation, the integrity of the subject pavement, including paint; ◦ Monitor the environmental effects of the Project on the visual environment using photographs taken from viewpoints comparable to those used for the visual simulations conducted as part of the environmental assessment. The Proponent shall take photographs annually during construction and every two years for the first 10 years after construction is completed and every five years thereafter, up to 25 years after construction is completed; ◦ Assess, by the end of the fifth year following completion of construction and using recognized survey methods, the impacts experienced by potentially affected parties of changes to the visual environment caused by the Project; ◦ Monitor, at least annually at the end of the plant growing season, the growth, composition, and abundance of vegetation for the operational phase; ◦ Develop and implement modified or additional mitigation measures if the results of the monitoring program demonstrate that modified or additional mitigation measures are required to mitigate the adverse environmental effects of the Project on the visual environment.
Socioeconomic Conditions	**Key Mitigation Measures** • Implement key measures regarding: ◦ Beluga whales and other marine mammals, presented in the section 5.2.2; ◦ Fish and fish habitat, presented in the section 5.3.2; ◦ Current use of lands, presented in the section 5.7.2; ◦ Physical and cultural heritage, presented in the section 5.8.2; ◦ Human health, presented in the section 5.10.2; ◦ Accidents and malfunctions, presented in the section 6.1.2. • Identify, prior to construction, parties potentially affected by the Project or by any environmental effects of the Project, including representatives of local and municipal governments, residents and users in the immediate vicinity of the Project, and community, environmental, recreational, tourism, economic and commercial organizations operating on the Saguenay River. For any measures that apply to the operation, potentially affected parties also include parties that operate along the St. Lawrence Estuary. Provide a list of potentially affected parties applicable to each phase of the Project, including contact information, to the Agency prior to construction and provide an updated list to the Agency upon request during any phase of the Project; • In consultation with potentially affected parties and First Nations, develop a communication plan and implement it for the construction phase, the operation phase and for the closure phase to inform of any activities that may affect recreational and tourism businesses in the Project area, users of the Saguenay River, users practising nautical activities in the vicinity of the site, fishing and any other recreational and tourism activities, as well as commercial navigation stakeholders. The plan shall include: ◦ A schedule detailing the dates and times of work that could generate nuisances for local communities and recreational and tourist users in the sector (for example, preparation and construction work on marine infrastructure requiring vibro-drilling of piles, construction of access roads to the site, blasting, drilling). The schedule will have to detail the periods of work that will be carried out in the water in order to allow users to adapt their recreational and tourism activities in the sector; ◦ Any other information relevant to the users and boaters of the Saguenay River in the Project area, the First Nations concerned and any other party involved or affected by the Project. • In consultation with potentially affected parties, including First Nations, develop and implement a communication plan, for the operation phase, to inform recreational tourism businesses operating along the Saguenay River and the St. Lawrence Estuary, users of the Saguenay River, users practising nautical activities in these sectors, fishing and any other recreational tourism activity, as well as commercial navigation stakeholders, including: ◦ The timeframe for the passage of tankers between the mouth of the Saguenay River and the Project site; ◦ The schedule of presence of the tankers in berth; ◦ Schedules of tanker loading operations; ◦ Navigation measures to be respected by recreational boaters and commercial vessels transiting near the Project site or docking at the Marcel-Dionne Wharf (Port of Grand-Anse). • Establish a protocol for receiving complaints regarding environmental effects caused by any component or activity of the Project and associated issues (including changes to air quality and noise exposure). Implement the protocol from the start of construction and throughout all phases of the Project. As part of the protocol implementation: ◦ Communicate the details of the protocol, including how to file a complaint and the timeframes within which the developer commits to respond to the complaint, to community members in the manner determined during the development of the protocol; ◦ Acknowledge any complaint received as quickly as possible, or within 48 hours of receipt of the complaint, and implement, as soon as technically feasible, any corrective measures under the responsibility of the Proponent in response to any complaint received, which may include modified or additional mitigation measures; ◦ Document any complaints received (including a description of the reason for the complaint) and how the Proponent responded to the complaint, including any modified or additional mitigation measures implemented or planned, or why no modified or additional mitigation measures are required to respond to the complaint. Also document any feedback received from the party submitting the complaint regarding the Prponent’s response to the complaint. • Develop, prior to the commencement of the operation phase and in cooperation with the appropriate authorities, and implement during operations, a Saguenay River navigation policy applicable to tankers associated with the Project, including when passing or crossing any other commercial vessel. Submit the policy to the Agency prior to operation. **Follow-up and Follow-up Requirements** • Develop, in collaboration with First Nations who demonstrate an interest, a follow-up program on the effects of the Project and the effectiveness of the mitigation measures on their socioeconomic activities, particularly for actovotoes related to the observation of marine mammals, for the operation phase of the Project; • Establish a monitoring and follow-up committee composed of representatives of the Proponent, recreation and tourism businesses, including First Nations, representatives of residents in the Project area, and other regional stakeholders such as the Saguenay-St. Lawrence Marine Park and the Saguenay Fjord National Park, as well as representatives of the various levels of government. This committee will have to examine the effectiveness of mitigation measures on socioeconomic conditions, particularly marine mammal watching activities in the Saguenay Fjord and the St. Lawrence Estuary. As part of the follow-up program:

Valued Component	Mitigation Measures, Monitoring and Follow-up
	○ Determine, during the development of the follow-up program, the indicators that will be used to verify the accuracy of the environmental assessment and judge the effectiveness of the mitigation measures with respect to socioeconomic conditions, particularly marine mammal watching activities and commercial green sea urchin fisheries; ○ Discuss, during the development of the follow-up program, opportunities for parties consulted during the development of the follow-up program to participate in the implementation of the follow-up program (including data collection), and allow for the participation of any interested parties; ○ Monitor annually the environmental effects caused by the Project on socioeconomic conditions, including marine mammal watching activities in the Saguenay Fjord and the St. Lawrence Estuary, based on identified indicators; ○ Develop and implement modified or additional mitigation measures that are the responsibility of the Proponent if the results of the monitoring demonstrate that modified or additional mitigation measures are required to mitigate the environmental effects caused by the Project on socioeconomic conditions, including marine mammal watching activities in the Saguenay Fjord and the St. Lawrence Estuary.
Human Health	**Key Mitigation Measures** <u>Air Quality</u> • Identify, prior to construction and in consultation with the relevant authorities, receptors likely to be affected by the environmental effects on human health of changes in air quality caused by the Project and submit the list of receptors to the Agency prior to construction; • Determine, prior to construction, the meteorological conditions for the limited study area that are conducive to dust emissions from the Project, including drought conditions and wind conditions. Of these conditions, identify high wind conditions during which blasting should not take place. Present these conditions to the Agency prior to construction; • Implement measures to reduce dust emissions from the Project at all phases. As part of these measures: ○ Develop the limited study area and optimize construction activities to minimize time and distance travelled between sites and equipment movements; ○ Pave access roads (including temporary access roads with temporary pavement) and unpaved road surfaces constructed as part of the Project as soon as technically and economically feasible and repair any damaged paved areas as soon as technically feasible; ○ Continuously clean and water as required the surfaces of the restricted study area (including areas where stripping, grading and blasting activities take place) to reduce dust generation and transport beyond the boundaries of the area; ○ Minimize the drop height of loading and unloading activities of any granular material required by the Project to the lowest technically feasible height; ○ Cover open loads of granular material during transport; ○ Minimize the area of blasting banks to the smallest technically feasible area; ○ Maintain a blasting mattress during any blasting event; ○ Temporarily cease all blasting associated with the Project during high wind conditions. Resume blasting when conditions permit; ○ Temporarily cease all Project's activities when weather conditions are conducive to the emission of dust that may result in the transport of dust to sensitive receptors. Resume activity when conditions permit. • Reduce loss of bare soil due to wind or rain during construction, including : ○ Fill in bare soil as soon as technically feasible, especially during the construction of the vegetated embankment; ○ Cover bare soil daily with waterproof sheets, as soon as work is completed for the day. • Give preference, through the tendering process, to contractors and suppliers of transport services required for the Project to those with superior environmental performance, especially for mitigating changes to air quality. <u>Acoustic Environment</u> • Carry out any construction activities that may generate noise beyond the property lines under its jurisdiction (including blasting activities and activities requiring the use of heavy equipment, off-road trucks, drills, crushing equipment, generators and compressors) during daylight hours (7:00 a.m. to 7:00 p.m.) from Monday to Friday (excluding holidays); • Use vibratory driving rather than pile driving for the installation of piles required for the Project; • During construction and operation, educate truck and bus drivers serving the Project on the speed limits applicable inside and outside the restricted study area and the importance of reducing the use of compression brakes and performing regular maintenance on their vehicles, including exhaust and emission control systems; • Optimize the soundproofing of noise-emitting equipment and components of the liquefaction plant associated with the Project, including : ○ Install sound insulation or absorption devices around noisy rotating equipment and equipment likely to transmit vibration noise emissions and inside buildings; ○ Use air coolers equipped with noise reduction devices; ○ Install compressors that have a maximum sound power of 85 dBA at one metre from the compressor. • Equip vehicles and equipment operated under the Project with very low dispersion curve back-up alarms that meet the applicable safety requirements. <u>Light Environment</u> • Install and maintain the flares required for the Project horizontally and contained within the thermal protection walls; • Install lighting required to access the top of the tanks on the opposite side of the tanks to the Saguenay River. **Follow-up and Follow-up Requirements** • Develop, prior to operation and in consultation with the appropriate authorities, and implement, during operation, 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 environmental effects of the Project on health, including the psychosocial reactions of the neighbouring populations and users of the environment to the perception of a nuisance and risk caused by the project in terms of noise, dust, contamination, light and changes to the landscape. Develop and implement modified or additional mitigation measures if the results of the follow-up program demonstrate that such measures are necessary to mitigate environmental health effects, including psychosocial responses to perceived nuisance and risk caused by the Project; • Prior to construction and in consultation with the relevant authorities, develop and implement a follow-up program to verify the accuracy of the environmental assessment and assess the effectiveness of mitigation measures with respect to the environmental effects of the Project on health caused by changes in air quality. The Proponent shall take into account applicable air quality standards and criteria, the Canadian Council of Ministers of the Environment Management guide for atmospheric management areas, management levels established under the Canadian Ambient Air Quality Standards, and baseline air quality conditions when developing and implementing the follow-up program. In implementing the monitoring program:

Valued Component	Mitigation Measures, Monitoring and Follow-up
	○ Monitor, during construction, the concentrations of nitrogen dioxide (NO_2) and sulphur dioxide (SO_2), total particulate matter (PMT), respirable particulate matter (PM_{10}) and fine particulate matter ($PM_{2.5}$); ○ Monitor, at least during the first three years of operation, the concentrations of nitrogen dioxide (NO_2) and sulphur dioxide (SO_2); ○ Compare monitoring results for fine particulate matter ($PM_{2.5}$), nitrogen dioxide (NO_2) and sulphur dioxide (SO_2) to Canadian Ambient Air Quality Standards in effect at the time the monitoring is conducted and for respirable particulate matter (PM_{10}) to World Health Organization guidelines; ○ Develop and implement modified or additional mitigation measures if monitoring and comparison results demonstrate that modified or additional mitigation measures are required to mitigate the environmental health effects of the Project due to changes in air quality; ○ Determine, by the end of the third year of operation and in consultation with the parties consulted in the development of the follow-up program, and based on the results of the monitoring and comparisons conducted, whether additional monitoring is required. If additional monitoring is required, the Proponent shall update the follow-up program and implement the additional follow-up program requirements. • Develop, prior to construction and in consultation with the relevant authorities, and implement during operation, 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 environmental effects of the Project on health caused by noise, including noise generated by tankers while docked at the Project site. Develop and implement modified or additional mitigation measures if the results of the monitoring program demonstrate that noise generated by the Project, including noise generated by tankers while docked, exceeds the noise levels modelled during the environmental assessment and that modified or additional mitigation measures are necessary to mitigate the environmental health effects caused by noise.
Effects of Accidents or Malfunctions	**Key Mitigation Measures** <u>General Measures</u> • Take all reasonable measures to prevent accidents and malfunctions that may result in adverse environmental effects and mitigate any adverse environmental effect from accidents and malfunctions that may occur, including consideration of the Canadian Standards Association's CSA Z276-2018 standard for the production, storage and handling of liquefied natural gas (including with respect to the design of the liquefied natural gas full containment tanks) and any information to which it has access with respect to accidents and malfunctions that have occurred in Canada or abroad in connection with activities similar to those associated with the Project; • Implement any measures recommended in the final report of the TERMPOL review process for the Project that are intended to prevent the environmental effects of the Project caused by accidents and malfunctions, including measures related to winter navigation and vessel protection in ice conditions on the St. Lawrence and Saguenay Rivers, exclusion zones, vessel traffic management on the Saguenay River, escort towing and personnel training, standby pilotage during loading operations, and marine terminal security; • Develop, prior to each phase of the Project and in consultation with the First Nations and the appropriate authorities, an accident and malfunction contingency plan applicable to each phase of the Project that takes into account the Canadian Standards Association standard CSA Z731-03 on emergency preparedness and response planning and any information to which it has access on emergency preparedness measures applied in Canada or abroad to activities similar to those associated with the Project. Reference in each plan the applicable established response plans, procedures and organizations, as appropriate, of the relevant authorities. Implement the plan applicable to each phase of the Project during that phase. Each emergency response plan includes: ○ A description of the types of accidents and malfunctions that may cause environmental effects during any phase of the Project, including the following potential accidents or malfunctions: ▪ While a tanker is at dock, a spill and/or fire associated with its cargo and/or a fire not associated with its cargo; ▪ When a tanker is loading, a spill and/or fire associated with its cargo and/or a fire not associated with its cargo. ○ Mapping of sensitive environmental features and receptors (including drinking water intakes and residences) located in the aquatic and terrestrial environment that could be affected in the event of an accident or malfunction and that must be considered during response to an accident or malfunction. The mapping includes a detailed legend to identify all sensitive features and receptors considered by the Proponent; ○ Measures under the responsibility of the Proponent to be implemented by the Proponent in response to each type of accident and malfunction to mitigate any environmental effects caused by the accident or malfunction and protect the environment. These measures include, but are not limited to, warning and notification of external parties, refloating measures in the event of a marine accident, and measures to quickly contain and clean up any area affected by a petroleum or hazardous materials spill; ○ The location and availability of equipment to respond to each type of accident and failure; ○ The roles and responsibilities (including actions to be taken and equipment to be mobilized) of each competent authority and any person or party (including employees and contractors associated with the Project) mandated to or who may be called upon to respond to an accident or malfunction. Provide detailed response scenarios that specify the actions to be taken by each jurisdiction of authority, person, and party and the time frames (minute by minute) within which each action must be taken. • Submit the emergency measures identified in its plans to the City of Saguenay to ensure a coordinated response to accidents or malfunctions that may occur during the marine transportation of liquefied natural gas and/or at the land-based facilities of the Project; • Share emergency response plans with the appropriate authorities. Inform them of the legislative and regulatory requirements for pollution prevention, including the *Canadian Environmental Protection Act*, the Environmental Emergency Regulations, the *Fisheries Act* and t*he Migratory Birds Convention Act, 1994*; • Post a copy of the emergency response plans in plain view of all employees associated with the Project; • Provide training to all employees associated with the Project (including employees assigned to the wharf) to prevent accidents and malfunctions (including maintenance and use of equipment and procedures for handling and transporting hazardous materials used on the Project) and all measures included in the emergency response plans to ensure that each employee knows how to respond to an accident or malfunction and can activate the appropriate emergency response. Document employee participation in training; • Consult, before construction, the Innu First Nations of the Essipiunnuat, the Pessamiulnutsh and the Pekuakamiulnuatsh, the Huron-Wendat Nation and the Wolastoqiyik Wahsipekuk First Nation, as well as the relevant authorities, on the measures to be implemented to prevent accidents and malfunctions; • Review accident and malfunction contingency plans (including to reflect any changes to processes or substances, equipment upgrades, or changes to toxicity risk) at least annually and maintain them (including mapping) throughout the Project phase applicable to each plan. Submit any updates to the emergency response plans to the Agency and the appropriate authorities involved in its implementation within 30 days of the update; • Implement immediately the appropriate measures described in the response plan in case of accidents or malfunctions that have the potential to cause adverse environmental effects: ○ Implement the communication plan in relation to accidents and malfunctions;

Valued Component	Mitigation Measures, Monitoring and Follow-up
	○ Inform, as soon as possible and in accordance with the communication plan, the Innu First Nations of the Essipiunnuat, the Pessamiulnutsh and the Pekuakamiulnuatsh, the Huron-Wendat Nation, the Wolastoqiyik Wahsipekuk First Nation, parties potentially affected and the relevant authorities about the accident or malfunction. Notify the Agency in writing not later than 24 hours after the accident or malfunction, specifying: ▪ The date and time when and location where the accident or malfunction occurred; ▪ A description of the accident or malfunction; ▪ The list of any substances potentially released into the environment as a result of the accident or malfunction. ○ Inform the 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, in particular: ○ A detailed description of the accident or malfunction and its adverse environmental effects; ○ A description of the measures that were taken by the Proponent to mitigate the adverse environmental effects caused by the accident or malfunction; ○ The point of view of the First Nations or potentially affected parties and advice from relevant authorities received with respect to the accident or malfunction, its adverse environmental effects and the measures taken by the Proponent to mitigate these adverse environmental effects; ○ A description of any residual adverse environmental effect and any modified or additional measure required by the Proponent to mitigate residual adverse environmental effects; ○ The details concerning the implementation of the accident or malfunction response plan. • Submit a written report to the Agency no later than 90 days after the day on which the accident or malfunction occurred, taking into account the information submitted previously, regarding the changes made to avoid a subsequent occurrence of such an accident or malfunction or the implementation of any modified or additional measure to mitigate and monitor residual adverse environmental effects and to carry out any progressive reclamation. The report includes the additional point of view of the Innu First Nations of the Essipiunnuat, the Pessamiulnutsh and the Pekuakamiulnuatsh, the Huron-Wendat Nation, the Wolastoqiyik Wahsipekuk First Nation and the parties potentially affected, as well as the advice of the additional relevant authorities received by the Proponent; • Update the communication plan before construction in consultation with the Innu First Nations of the Essipiunnuat, the Pessamiulnutsh and the Pekuakamiulnuatsh, the Huron-Wendat Nation, the Wolastoqiyik Wahsipekuk First Nation and the potentially affected parties. Implement and update the communication plan during every phase of the Project. The communication plan includes, in particular: ○ The types of accidents and malfunctions requiring that the Proponent notify each of the First Nations and potentially affected parties; ○ The manner in which each of the First Nations and the potentially affected parties must be notified by the Proponent of an accident or malfunction and the possibilities for the First Nations and potentially affected parties to provide any assistance following the accident or malfunction; ○ The contact information of the Proponent's representatives with whom the First Nations and the potentially affected parties may communicate and the contact information of the representatives of each of the First Nations and the potentially affected parties the Proponent notifies. • Participate, at the request of the City of Saguenay and throughout the duration of the Project, in any initiative (including any committee) related to the management of environmental risks to which the Project may contribute. <u>Measures Specific to the Terrestrial and Marine Infrastructure</u> • Maintain (including at locations where petroleum products and hazardous materials are stored or handled, where equipment and vehicles are refuelled, and in vehicles) and keep operational at all times, during all phases of the Project, all equipment necessary to respond to accidents or malfunctions (including spill kits containing absorbent materials and leak-proof containers to collect petroleum products and other hazardous residual materials); • Maintain an operational dockside fire protection system (including the wharf and the liquefaction plant) that meets the technical requirements and risks of the Project and is designed by a qualified person who is an engineer licensed to practise in Quebec; • Install and maintain an operational gas leak detection and emergency shutdown system at the liquefaction plant and liquefied natural gas loading facilities during the operational phase; • Develop and implement a communication plan prior to the operation phase to establish constant communication with the company responsible for unloading explosives on the Grande-Anse wharf and ensure that loading of liquefied natural gas cannot be done at the same time as unloading of explosives; • Maintain, during all phases of the Project, petroleum product transfer sites, equipment and tanks that comply with the requirements of applicable regulations, standards and codes and good industry practices, including a petroleum product leak or spill detection system; • Place any diesel tank located on a concrete slab and provide a sump under each tank to catch any petroleum products in the event of a spill or leak from the tanks; • Develop and maintain, during all phases of the Project, storage areas dedicated to the storage of hazardous materials and handle any hazardous materials within the Project in a manner that reduces the risk of leakage or spillage, including the use of compliant, leakproof containers; • Post and maintain accessible at all times Material Safety Data Sheets (MSDS) for each hazardous material stored in the restricted study area or handled on the Project to ensure proper segregation of hazardous materials during storage and prompt identification of the relevant characteristics of each hazardous material to be addressed in the event of a leak or spill of hazardous material(s). <u>Measures Specific to Marine Shipping</u> • Complete, prior to construction, an enhanced quantitative maritime risk analysis. In doing so, the proponent shall: ○ Submit the analysis to the Agency, Transport Canada and other relevant authorities prior to construction; ○ Develop and implement, in consultation with Transport Canada and other relevant authorities, any additional measures recommended in the analysis to prevent accidents and malfunctions that may result in environmental effects from the Project. These measures include establishing safety zones around the loading arms with a minimum radius of 200 metres, taking into account the following: ▪ Existing safety zones established around other marine liquefied natural gas handling facilities in Canada and the U.S. (including Canaport LNG facilities in New Brunswick); ▪ The International Organization for Standardization standard ISO 28460 for liquefied natural gas facilities and equipment (land-ship interface and port operations); ▪ The geographic location of the Project and the anticipated marine traffic during operation. ▪ Establish a speed limit of 10 knots for tankers downstream from the area of jurisdiction of the Saguenay Port Authority, as long as it is safe for them;

Valued Component	Mitigation Measures, Monitoring and Follow-up
	▪ Establish an approach manoeuvre and mooring zone, in consultation with the Laurentian Pilotage Authority, so that any ship associated with the Project can approach the wharf at reduced speed, subject to navigation safety; ▪ Determine a maximum wind speed for mooring and let go, in consultation with the Laurentian Pilotage Authority, which accounts for the sails of the ships associated with the Project, subject to navigation safety, and establishes a corresponding maximum wind speed at which tanker loading and unloading activities must stop.

Appendix D: Summary of First Nations Concerns

This appendix presents a summary of the main comments received from First Nations during the environmental assessment, as well as the responses provided by GNL Québec Inc. (the Proponent) and the Agency up to the release of the draft environmental assessment report on September 22, 2021. The concerns were synthesized by the Agency from the issues raised during the various meetings with the First Nations and from the briefs submitted during the environmental assessment process. A more detailed follow-up of their issues was shared with the First Nations. The comments are presented in the order of the 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
Innu First Nations of the Essipiunnuat (IFNE) and of the Pessamiulnutsh			
Greenhouse gas	The IFNE believes that the Proponent should offset all unintentional emissions of liquefied natural gas to the atmosphere.	The Proponent has presented several measures for reducing greenhouse gas emissions in the operational phase. These measures are also found in the technical note presented in Appendix R-35 of the responses to the first request for information (WSP, January 2020). The Carbon Neutrality Plan submitted by the Proponent in the Second Information Request (WSP, December 2020, Appendix R-2-33) includes offsetting fugitive losses from the liquefaction process.	As this Project is being assessed under the CEAA 2012, the Proponent is not required to provide a detailed plan to achieve net zero emissions in 2050. The Proponent has committed to implementing a carbon neutrality program when the plant begins operation (WSP, December 2020). However, this program does not cover all emissions from the Project. A greenhouse gas management plan is requested as a key mitigation measure (section 5.1).
Maritime transport	Innu First Nations have raised several issues concerning the direct and cumulative effects related to marine transportation (increased traffic, wildlife disturbance, collisions, accidents, spills).	The Proponent presented a description of the potential cumulative effects of its Project (Chapter 11 of the impact study, WSP, December 2019). Chapter 12 of the impact study also deals with the assessment of the environmental effects and risks related to the increase in maritime transport on the Saguenay. According to the Proponent, the direct and cumulative effects of the maritime transport generated by its Project are not likely to be significant because of the mitigation measures put in place.	The direct and cumulative effects related to marine transportation are assessed by the Agency in the various sections of the environmental assessment report, including those dealing with uses and rights. The Agency concludes that the marine transportation generated by the Project would have repercussions on the uses and rights of the Innu First Nations, particularly in terms of access and experience. The Agency also concludes that there would be significant effects on beluga whales and marine mammals in relation to marine transportation. Accidents and malfunctions have been addressed by the Agency in section 6.1 of its environmental assessment report. Mitigation measures have been identified by the Agency to mitigate many of these effects, some of which require the Proponent to consult with First Nations.
Marine mammals, including the St. Lawrence Beluga whale	The IFNE questioned the feasibility of the voluntary measure to reduce speeds to ten knots in terms of vessel manoeuvrability.	The Proponent has indicated that the voluntary speed reduction to ten knots will be applied as long as safety of navigation is not compromised, depending on sea and traffic conditions. It will be up to the pilots to make the final decision, but the need to navigate faster should only occur in exceptional conditions.	The Agency has developed a key mitigation measure to address this issue (see Section 5.2.2 of the report for details of the measures). It indicates that this measure should be applied to the extent that the safety of the vessel and its crews is not compromised. In order to meet the need for an adaptive approach, this measure will have to be reviewed annually based on the most recent scientific data acquired, in consultation with stakeholders and using existing work platforms.
Marine mammals, including the St. Lawrence Beluga whale	The two First Nations shared several concerns regarding the future of the beluga whale and the integrity of the Saguenay-St. Lawrence Marine Park. Concerning the beluga whale, they also shared several questions regarding the effects of underwater noise and indicated a lack of information regarding the increase of this noise.	With regard to underwater noise, the Proponent provided answers to the Agency's questions about the increase in underwater noise and its potential effects. The Proponent indicates, however, that there are still uncertainties regarding the evaluation of the significance of the effect since the current understanding of the effects of underwater noise on marine mammals is partial. The synergistic effect of the various threats to the species is also poorly known and therefore difficult to evaluate.	The Agency concludes that, despite the implementation of key mitigation measures, the Project is likely to result in significant adverse direct and cumulative environmental effects on beluga whales. Section 5.2 of the Agency's report provides more detail on the Agency's analysis and conclusions on this subject as well as the key mitigation measures related to underwater noise.

Theme	Summary of the comment or concern	Summary of the Proponent's response	Agency's response
Innu First Nations of the Essipiunnuat (IFNE) and of the Pessamiulnutsh (continued)			
Fish and fish habitat	The IFNE is concerned about the effects of the Project on deballasting and the introduction of invasive species. It requests monitoring of ship ballast water treatment systems and monitoring of invasive alien species.	The Proponent indicated that it would comply with the regulations in force concerning the management and monitoring of ballast water.	The Agency believes that the laws and regulations surrounding ballast water management allow for proper management of ballast water, particularly to avoid the introduction of invasive alien species. Transport Canada specifies that the new Ballast Water Regulations, which came into force in June 2021, will further reduce the risks of introduction and spread of invasive aquatic species. Uncertainty remains due to the salinity conditions in the Saguenay River area, which vary significantly depending on depth and season. It is for this reason that the Agency has requested that a follow-up program be set up by the Proponent before the start of the construction phase. This issue is addressed in section 5.3 - Fish and Fish Habitat.
Current use of lands and resources for traditional purposes	The IFNE shared its concerns about the ability of its members to continue to practise their traditional activities.	The Proponent indicated that the protection of the environmental and socioeconomic components valued by the IFNs is part of the objectives of its environmental management programs. Monitoring of these activities will be carried out through the community data collection systems. Any significant changes may be reported to the joint committee or future environmental subcommittee for further analysis as appropriate.	The Agency believes that the increase in vessel traffic during the operational phase is the primary source of the potential impact on the current use of lands and resources for traditional purposes (section 5.7). The increase in the number of vessels and the increased risk of accidents and collisions could affect First Nations' safe access to their practice areas. The Agency notes that the experience on the Saguenay River and on the river could be altered by the presence of a greater number of vessels and larger vessels. However, the Agency believes that these effects on traditional practices are not likely to be significant. Effects on the resources hunted and fished by IFNs, and measures to mitigate them, are described in the report in the sections on birds (5.5), marine mammals (5.2) and fish (5.3). These effects are not, in the Agency's analysis, likely to be significant.
Socioeconomic conditions	The IFNE and IFN of Pessamiulnutsh are concerned about the effects of the Project on their commercial urchin fishery.	According to the Proponent, an increase in navigation limited to approximately one ship passage per day in this very busy sector of the mouth where this type of fishing is practised will not have a significant effect on the contamination of the environment, considering the regulations governing the management of oily water discharges and the high dilution capacity of the water body.	The risks of marine accidents and malfunctions and the potential effects of the Project on economic activities, including the Innu First Nations urchin fishery, were discussed in the Agency's report under Socio-Economic Conditions (5.9) and Current Land Use (5.7). The Agency has identified mitigation measures to reduce the risk of accidents and malfunctions and to reduce the effects on socioeconomic activities. With respect to commercial fisheries, the Agency concludes that the effects of the Project are not likely to be significant due to the implementation of mitigation and accident prevention measures.
Socioeconomic conditions	The IFNE shared its concerns regarding the effects of marine transportation on the recreational tourism activities offered by Essipit and Mer et Monde Ecotours.	The Proponent proposes several mitigation measures in section 9.5.6 of the impact study (WSP, January 2019), including limiting the speed of vessels to ten knots, as long as it remains safe for them. The Proponent indicates that discussions about Aboriginal businesses that may be affected by changes to the environment caused by the Project, as well as their ability to maintain their operations, will be part of future discussions within the Environment Subcommittee.	The Agency believes that the significant negative environmental effects of the Project on beluga whales would not immediately or totally compromise the continuity of recreational tourism activities. However, the Agency remains concerned about the potential cumulative effects of the increase in merchant ships on marine mammals and the recreational tourism experience valued by visitors to the region and the Saguenay-St. Lawrence Marine Park. These effects could have a long-term impact on the socioeconomic conditions of regional recreation and tourism businesses and associated activities. The Agency considers it important to set up a follow-up program on the effects of the Project and the effectiveness of the mitigation measures on socioeconomic activities related to recreation and tourism (more details in section 5.9.2 of the Agency's report).
Innu First Nations of the Pekuakamiulnuatsh (IFNP)			
Greenhouse gas	The IFNP shared several comments regarding the application of the precautionary principle and the Proponent's carbon neutrality objective	The Proponent has submitted a carbon neutrality approach (Appendix R-2-33 of the Second Information Request, WSP, December 2020). Carbon neutrality addresses emissions from the operating liquefaction process, including fugitive emissions.	(See IFNE response above regarding carbon neutrality requirements that cannot be enforced) Carbon neutrality is addressed in Section 5.1 of the Agency's report.
Cumulative effects	The IFNP shared several comments and concerns regarding the cumulative effects of the project particularly for terrestrial species.	According to the Proponent, the cumulative effects of its Project on the biological environment will not be significant, in particular because of the direct effects of the Project, which the proponent considers to be weak.	According to Environment and Climate Change Canada, the Project's contribution to cumulative effects would be low and sufficient forest and wetland habitat suitable for avian, chiropteran and turtle species would remain available at the regional scale to support local populations.

Theme	Summary of the comment or concern	Summary of the Proponent's response	Agency's response
			The Agency has identified several key mitigation measures including monitoring and tracking of the biological environment. Under subsection 79(2) of the Species at Risk Act, responsible authorities, including the Saguenay Port Authority, must ensure that measures are taken to avoid or minimize adverse effects of a project on wildlife or critical habitat and to monitor those effects. In order to address the issues raised by the IFNP, the Agency has also identified complementary measures related to cumulative effects (sections 5.5 and 5.6).
Marine mammals, including the St. Lawrence Beluga whale	The IFNP raised the cultural importance of beluga to the Innu.	The Proponent presented several initiatives that could be the object of a future collaboration with the Innu First Nations in relation with the beluga whale and its cultural importance for the Innu: • Co-financing of a doctoral project related to the development of knowledge on the importance of the beluga whale on the social and cultural importance of the beluga to the Innu; • Promotion of the importance of the beluga whale through interpretation initiatives (signs or other);	The Agency has taken into account in its analysis that the beluga whale is culturally significant. The assessment of the effects of the Project on Innu cultural heritage in relation to the beluga whale is found in section 5.8. Impacts on the rights of INFs in relation to the potential effects of the Project on beluga whales are also assessed in Section 7. In relation to the significant effects of the Project on beluga whales, the Agency concludes that there are moderate to high impacts on the rights of Innu First Nations and significant effects on their cultural heritage.
Birds and birds habitat	The IFNP has proposed a monitoring program for wildlife, birds (including migratory birds), their eggs and nests.	The Proponent proposed a monitoring program and a follow-up program in response to Question ACEE-122 (First Information Request, WSP, January 2020) and clarifies its monitoring program in Question AEIC-2-47 of the Second Information Request (WPS, December 2020.	The Agency recommends that : • A bird monitoring program (including species at risk); • A follow-up program on birds (including migratory birds and birds that are listed species at risk) to validate the presence of species at risk around the study area, as well as their use of the area; • A follow-up program to assess the effect of noise on the use of the area by breeding birds. The Agency considers in its analysis the bird species protected by the *Migratory Birds Convention Act* or the species listed on Schedule 1 of the *Species at Risk Act*. Other bird species has been addressed through the provincial process.
Terrestrial fauna at risk	The IFNP proposed the implementation of a monitoring and compensation program for bats (install bat nesting boxes in the study area).	A preliminary terrestrial wildlife monitoring program is presented in Appendix R-125 of the first information request (WSP, January 2019).	In response to IFNP's request, the Agency developed a key mitigation measure to install artificial bat roosts and maintain them throughout the life of the Project. The Agency also recommends that a follow-up program be put in place to verify the accuracy of the environmental assessment and to assess the effectiveness of the mitigation measures related to the adverse environmental effects attributed to the Project on the northern bat, little brown bat and eastern pipistrelle.
Current use of lands and resources for traditional purposes	The IFNP is concerned about the effects of increased shipping on the biotic and abiotic environment and, in turn, on the practice of traditional activities such as fishing and migratory bird hunting.	Details were provided by the Proponent on the safety measures envisaged as well as on the characteristics of the vessels that would limit the consequences in the unlikely event of a major incident.	Effects on resources hunted and harvested by IFNs are described in the report in the sections on birds (5.5), seals (5.2) and fish (5.3). These effects are not, in the Agency's analysis, likely to be significant. The Agency believes that the increase in vessel traffic during the operational phase is the main source of potential effect on the current use of lands and resources for traditional purposes (section 5.7) in terms of access and experience (vessel presence).
Huron-Wendat Nation (HWN)			
Marine mammals, including the St. Lawrence Beluga whale	The HWN has raised some issues regarding the implementation of monitoring measures related to underwater noise.	The Proponent's commitments regarding the issue of underwater noise include an in situ monitoring program for noise generated by the construction and operation of the Project, including noise generated at the marine terminal facilities. In particular, marine mammal monitoring during in-water construction would be conducted from April to October, which is the period of time when beluga whales are most likely to be present in the Project area. The noise mitigation measures identified would be implemented as soon as the work begins.	The Agency has developed several key mitigation measures related to underwater noise (see details of the measures in Section 5.2.2. of the report). The Agency concludes that, despite the implementation of the key mitigation measures, the Project is likely to result in direct and cumulative significant adverse environmental effects on beluga whales.

Theme	Summary of the comment or concern	Summary of the Proponent's response	Agency's response
Huron-Wendat Nation (HWN) (continued)			
Marine mammals, including the St. Lawrence Beluga whale	The HWN believes that the Proponent should implement a beluga whale habitat improvement project.	The Proponent has developed a charter of environmental commitments for the protection of marine mammals.	The Agency has developed key mitigation measures for this issue (see details of the measures in Section 5.2.2 of the report) The Agency also shared with HWN a list of existing federal projects and programs for beluga whale habitat improvement related to underwater noise.
Marine mammals, including the St. Lawrence Beluga whale	The HWN has requested that vessel speeds of ten knots be required and lowered at St. Margaret's Bay.	The Proponent also presented its commitment to speed reduction by lowering the speed in this area (Grosse Île area) to eight knots.	The Agency has developed a key mitigation measure in this regard (see details of measures in Section 5.2.2): In order to limit collisions with marine mammals, maintain the speed of tankers and escort tugs below ten knots between Les Escoumins and the Project site and below eight knots in the Grosse Île sector, as long as the safety of the vessel and its crews is not compromised. In order to meet the need for an adaptive approach, this measure will have to be reviewed annually based on the most recent scientific data acquired, in consultation with stakeholders and using existing work platforms.
Fish and fish habitat	The HWN raised concerns that the Proponent's impact statement did not sufficiently demonstrate the absence of American eel in the streams affected by the Project.	Following the impact study, the Proponent conducted fishing on June 18 and 19, 2019, in the CE-03 stream and in the unnamed Lake 2. This period corresponds with the elver/fingerling run. Two segments of stream CE-03 were also fished with an electrofishing device. A second visit was made to conduct fisheries between October 22 and 24, 2019. The fisheries did not capture any American eels.	Fisheries and Oceans Canada considers that the fisheries carried out in the freshwater tributaries of the Saguenay River that would be affected by the Project confirm the absence of eels in these waterways.
Vegetation and wetlands	The HWN raised the possibility that the importance of wetlands in the limited study area may have been underestimated.	All project encroachments on wetlands were presented by the Proponent in response to the first request for information (WSP, January 2019, R-79). The Proponent plans, through the engineering stages, to optimize the positioning of infrastructure to limit the impact on wetlands and waterways.	In general, Environment and Climate Change Canada is of the opinion that the baseline condition for wetlands has been adequately described for the purposes of the environmental analysis of the Project. Section 5.4 of this report describes the wetlands and the potential effects of the Project on them. The Agency concludes that the potential effects on this component are moderate.
Vegetation and wetlands	The HWN requested additional information on the identification and monitoring of wetland and water-related compensatory measures.	The various compensation options will be presented by the Proponent to the MELCC for discussion before the detailed compensation plan is submitted. The monetary compensation provided for in the new regulations is also being considered in whole or in part depending on the discussions to come with the MELCC. The First Nations will be consulted on the compensation plan.	Water compensation is a provincial responsibility. The Federal Policy on Wetland Conservation proposes to "recognize and support existing provincial and territorial policies that promote wetland conservation". In the event that compensation under the *Wetlands and Water Conservation Act* is developed through a compensation plan developed by the Proponent (rather than through financial compensation as is possible under the *Wetlands and Water Conservation Act*), the Agency requests that the Proponent consult with the Agency, Environment and Climate Change Canada and First Nations to ensure that their concerns are addressed in the plan and to discuss with each First Nation their involvement in the implementation of the plan (section 5.4).
Vegetation and wetlands	The HWN would like to see compensatory measures required of the Proponent for the disturbance of the seagrass beds.	Comment to the Agency.	This concern has been incorporated into the report (Section 5.3). A key mitigation measure has been developed that specifies that the fish and fish habitat compensation plan, including the loss of aquatic vegetation and intertidal grass beds, must be developed prior to construction to the satisfaction of Fisheries and Oceans Canada and in consultation with willing First Nations. This measure also includes opportunities for First Nations to participate.
Birds and birds habitat	The HWN considers the permanent or temporary destruction of habitat supporting approximately 300 nesting pairs to be a significant disturbance and the Project mitigation measures described to be insufficient.	Comment to the Agency.	This issue is addressed in Section 5.5. For terrestrial and aquatic bird species with healthy and resilient populations, Environment and Climate Change Canada is of the opinion that the mitigation measures planned by the Proponent, if implemented in a timely manner, would minimize the residual environmental effects of the Project on migratory birds. Environment and Climate Change Canada is also of the opinion that the mitigation measures planned by the Proponent would minimize the potential environmental effects of the Project on avian species at risk or their habitat, within the limited and extended study area. However, Environment and Climate Change Canada is of the opinion that it is essential to carry out any

Theme	Summary of the comment or concern	Summary of the Proponent's response	Agency's response
			activity potentially harmful to migratory birds outside the nesting season in order to avoid injuring, killing or disturbing individuals or destroying and disturbing their nests and eggs.
Physical and cultural heritage	The HWN wants to be involved early and at all levels in the archaeological assessment process.	The Proponent has undertaken to hold discussions with the HWN prior to construction regarding the validation of areas of potential and its presence during archaeological interventions.	Several measures identified in collaboration with the HWN have been incorporated into the report (section 5.8) and potential conditions. In particular, the presence and participation of First Nations representatives during archaeological interventions, including the HWN, is required.
Follow-up	The HWN has asked to be involved in the biological monitoring.	The Proponent indicated that HWN's participation in environmental monitoring would be part of a collaborative agreement with HWN.	The environmental assessment report includes consultation with HWN on several follow-up programs (wildlife at risk, fish, birds, wetlands, and beluga) in the key mitigation measures (Sections 5.6, 5.3, 5.5, 5.4, and 5.2, respectively) and enforceable Project conditions.
Wolastoqiyik Wahsipekuk First Nation (WWFN)			
Marine mammals, including the St. Lawrence Beluga whale	The WWFN would like the Proponent to commit to collaborate in the implementation of measures related to beluga whales (rest areas, navigation measures, funding for research projects, etc.)	Comment to the Agency.	Several mitigation measures have been determined by the Agency (section 5.2.2) in order to limit the disturbance of beluga: speed below 8 knots near the Sainte-Marguerite Bay protection zone, maximum speed of 10 knots between the Project site and Les Escoumins. The Proponent must also set up a monitoring program in collaboration with First Nations.
Socioeconomic conditions	The WWFN is concerned about the impact of the Project on its commercial fisheries activities in relation to the risk of accidents.	Comment to the Agency.	The effects of the Project on socioeconomic conditions are assessed in Section 5.9. Information provided by the WWFN regarding its commercial fishing activities is included. The Agency is of the opinion that the risk of accidents and malfunctions has been properly assessed by the Proponent and that the Proponent proposes adequate measures to avoid this risk (see section 6.1).