Bureau d'audiences publiques sur l'environnement

Joint Review Panel

Report 230

Cacouna Energy LNG Terminal Project

TRANSLATION

Inquiry and Public Hearing Report

November 2006

Canada

Québec

The notion of the environment

In a perspective of sustainable development, the commissions of the Bureau d'audiences publiques sur l'environnement review projects submitted to them by applying the notion of the environment retained by higher courts, which encompasses biophysical, social, economic, and cultural aspects.

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Bureau
d'audiences publiques
sur l'environnement
Québec

Quebec, November 1st, 2006

Mr. Claude Béchard
Minister of Sustainable Development,
Environment and Parks
Marie-Guyart Building, 30th floor
675, René-Lévesque Boulevard East
Quebec, QC G1R 5V7

Dear Minister Béchard:

I am pleased to submit to you the report of the Bureau d'audiences publiques sur l'environnement (BAPE) concerning the Cacouna Energy Liquefied Natural Gas (LNG) Terminal Project. The commission mandated to hold an inquiry and public hearings, which began on May 8, 2006, was chaired by Mr. Michel Germain, assisted by Mr. John Haemmerli.

As a result of its work, the commission considers that the project would satisfy part of the demand for natural gas anticipated in Quebec, Ontario and the north-eastern United States. However, it would only marginally increase the security of Quebec's supply, primarily in the event of a major break in the pipeline system transporting gas from the west, since the North American natural gas market is integrated.

I wish to note that the commission reiterates a position taken by other BAPE commissions, namely, that an essential component like the gas pipeline that will be required to connect the project to the North American natural gas system should be reviewed at the same time as the main project, in this case the LNG terminal. Since participants in the current public review have already raised concerns about the gas pipeline the commission considers that any government authorizations to begin work on the LNG terminal should be conditional on a public environmental review of the gas pipeline project leading to a favourable decision by government.

Yours sincerely,

William J. Cosgrove
President

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Bureau
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sur l'environnement
Québec

Quebec, October 30, 2006

Mr. William J. Cosgrove
President
Bureau d'audiences publiques sur l'environnement
Lomer-Gouin Building
575, Saint-Amable Street, Suite 2.10
Quebec, QC G1R 6A6

Dear Mr. President:

I am pleased to submit to you the review and public hearing report of the commission mandated to review the Cacouna Energy Liquefied Natural Gas (LNG) Terminal Project.

Based on its analysis, the commission has concluded that the development of Petro-Canada and TransCanada PipeLines Limited's project would contribute to maintaining, even slightly increasing, the share of natural gas in the North American market in comparison to other fossil fuels known to emit more greenhouse gases. However, the project has no market outlet since the pipeline needed to connect it to the North American market has not yet been delineated and subject to an environmental assessment.

The LNG terminal would be built on federal land that is zoned industrial, but located adjacent to a human environment that is essentially rural and recreational, as well as a natural coastal environment that has high terrestrial and marine biodiversity values. The development of this major industrial facility would confirm the industrial orientation of the Municipality of Cacouna; but could constitute an impediment to local tourism and resort development.

The commission, in addition to the proponent and government authorities, has suggested certain mitigation measures. Diligent implementation of these measures, along with appropriate monitoring and follow-up by government agencies, should reduce the significance of environmental effects to an acceptable level.

…2

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However, uncertainties remain in relation to the effectiveness of some measures, such as those to attenuate noise or protect birdlife. Careful follow-up therefore appears necessary in order to apply additional measures if necessary.

To conclude, allow me to acknowledge the excellent work of the commission team and to express my thanks to them.

Michel Germain
BAPE Commission Chairman

Canada Québec

Quebec, November 1st, 2006

The Honourable Rona Ambrose
Minister of the Environment
House of Commons
Ottawa, ON K1A 0A6

Mr. Claude Béchard
Minister of Sustainable Development,
Environment and Parks
Marie-Guyart Building, 30th Floor
675, René-Lévesque Boulevard East
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Dear Minister Ambrose
Dear Minister Béchard:

The Joint Review Panel for the Cacouna Energy Liquefied Natural Gas (LNG) Terminal Project has completed its review in accordance with the mandate it received on April 7, 2006. As chair of the Joint Review Panel, I am pleased to submit our report to you. Please note that the BAPE commission and the Joint Review Panel agreed to prepare a common report.

The Joint Review Panel assessed the project in the context of sustainable development, applying the concept of environment held by the higher courts which includes biophysical, social, economic and cultural aspects. In addition, the Panel ensured the requirements of the *Canadian Environmental Assessment Act* and the *Quebec Environment Quality Act* were satisfied, as stipulated in the *Canada-Quebec Agreement on Environmental Assessment Cooperation*.

I wish to express my gratitude to my colleagues John Haemmerli and Jean-Thomas Bernard, as well as to the team that assisted the Panel throughout the process. Finally, on behalf of the Joint Review Panel members, I would like to acknowledge the significant contribution of the participants in the public hearings.

Yours sincerely,

Michel Germain
Chair, Joint Review Panel

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In its report and based on its analysis, the Panel sets forth a certain number of recommendations that are presented hereafter. The reader should nonetheless refer to the context in order to fully appreciate their significance and scope.

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Surface water management and water and soil quality

Recommendation 2 – The Panel recommends that Transport Canada require the proponent to provide a surface water management plan, including management of water from hydrostatic tests, from the time land preparation work begins. It also recommends that the proponent conduct follow-up on discharges into the St. Lawrence Estuary. → p. **67**

LNG tanker and tugboat traffic

Recommendation 3 – The Panel recommends that the proponent conduct follow-up on the icing conditions on the south shore of the Gros-Cacouna port entrance in order to understand the effect of repeated passage of tugs. In case shoreline freeze-up is impacted, Transport Canada should consider measures to limit the speed of tugs in this area. → p. **72**

Fish and invertebrates

Recommendation 4 – The Panel recommends that the effectiveness of the mitigation measures planned to prevent entrainment of larvae and juvenile fish during hydrostatic tests, construction of the LNG terminal, and LNG tanker ballast water pumping operations should first be demonstrated by the proponent to the satisfaction of Fisheries and Oceans Canada and the Ministry of Natural Resources and Wildlife. → p. **76**

Recommendation 5 – The Panel recommends that the solution chosen by the federal and provincial governments to manage the dredged material not result in additional hazards and safety problems for the population in the surrounding area. → p. **77**

Recommendation 6 – The Panel recommends that the proponent provide information to Transport Canada, Fisheries and Oceans Canada, and the Ministry of Sustainable Development, Environment and Parks concerning the construction, operation and dismantling of the temporary dock that will be

used to build the LNG terminal within the framework of this environmental assessment. The proponent shall establish the impact of this work on the natural environment and on the port's operations, as well as on the habitat areas to compensate, if necessary. → p. **77**

Recommendation 7 – The Panel recommends that the proponent's fish habitat compensation plan for losses and disturbances to fish habitats be filed at Fisheries and Oceans Canada under the current environmental assessment. → p. **78**

Marine mammals

Recommendation 8 – The Panel recommends that if Fisheries and Oceans Canada authorizes work in the marine environment to build the marine facilities of the LNG terminal, then this department should ensure that the mitigation measures required from the proponent are effective, or propose other measures. → p. **85**

Cumulative effects on fish and marine mammals

Recommendation 9 – The Panel recommends that the proponent complete the analysis of cumulative effects on loss of fish habitat related to marine facilities as part of this environmental assessment. → p. **87**

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Recommendation 10 – The Panel recommends that the proponent propose, within this environmental assessment, mitigation and follow-up measures to ensure the longterm use of the Peregrine Falcon nesting areas, in accordance with the Action Plan for Recovery of the Species. → p. **91**

Recommendation 11 – The Panel recommends that no facilities or activities related to the construction site and operation of the LNG terminal be authorized between the current access road and the Cacouna marsh, near the site entrance. It also recommends that the proponent take measures, such as the construction of a noise-abatement wall during site preparation, to screen the marsh from noise during construction and operation of the LNG terminal. → p. **95**

Recommendation 12 – The Panel recommends that the blasting of the cliff be limited to removing irregular rocks in order to level the land. This aims to protect avifauna and neighbouring wildlife habitats. In addition, blasting should only be authorized outside of the nesting period, in the timeline specified by Environment Canada and the Ministry of Natural Resources and Wildlife, i.e. from October to February. → p. **95**

Cumulative effects on wildlife habitats

Recommendation 13 – The Panel recommends that the proponent submit to Transport Canada and to Environment Canada, as part of this environmental assessment, pipeline route options on Transport

Canada harbour property, along with an assessment of the impacts of the pipeline including cumulative effects. → p. **97**

Characterization of the environment and noise impact modeling

Recommendation 14 – Since the three year duration of construction work cannot be considered to be short, the Panel recommends that the noisy work be allowed during the day only. Certain work could be allowed in the evening and at night on the condition that the proponent demonstrate to the Ministry of Sustainable Development, Environment and Parks that the noise levels, including peak noise, would be under the Ministry's criterion and that he undertakes to monitor it continuously at night and remedy the situation as required. → p. **105**

Recommendation 15 – Owing to the proximity of the centre of Cacouna village, the Panel recommends that no major source of noise, such as crushers, be installed for construction purposes on the site now being operated at the Port of Gros-Cacouna. → p. **105**

Recommendation 16 – The Panel recommends that noise levels from the LNG terminal construction site be monitored continuously at the sensitive receptor sites identified by the proponent and used to characterize the ambient noise environment. If the noise regularly exceeds the criteria set forth in the Ministry of Sustainable Development, Environment and Parks' guidelines, the proponent should take measures to reduce noise emissions. → p. **105**

Air quality and health

Recommendation 17 – The Panel recommends that atmospheric emissions from construction of the LNG terminal be monitored continuously, so that whenever air quality criteria are exceeded, remedial action can be taken rapidly. → p. **111**

Recommendation 18 – The Panel recommends that the proponent build and operate a sampling station to monitor the main compounds that could exceed standards during operations (ozone, NO2, particulate matter), as well as fugitive emissions. This station should be installed when work begins. → p. **113**

Effects of project on the visual quality of the environment

Recommendation 19 – The Panel recommends that the proponent, in collaboration with the municipal authorities and associations working in the area of heritage protection, review the visual integration of the project in an effort to make it blend into its surroundings. → p. **118**

Recommendation 20 – The Panel recommends that the gas pipeline metering station be taken into account in the LNG terminal architectural integration plan. → p. **120**

Impacts of the project on the Malécite nation

Recommendation 21 – Should Environment Canada establish the authenticity of the rock paintings in the cave located on the Gros Cacouna peninsula, the Panel recommends that Environment Canada supervise the blasting activities carried out by the proponent. → p. **125**

Project impacts on the Port of Gros-Cacouna

Recommendation 22 – The Panel recommends that Transport Canada provide an area in the Port of Gros-Cacouna in order to continue providing recreational boaters with a safe, accessible haven at all times in case of unforeseen problems. The proponent should assume any cost for such a measure. → p. **130**

The île Verte emergency link

Recommendation 23 – The Panel recommends that the proponent provide the île Verte health committee with the means to get around the LNG terminal berthing wharf, so that it will not constitute an obstacle for boats used to evacuate people in emergencies. → p. **133**

Municipal services

Recommendation 24 – The Panel recommends that the sources of project water supply be defined and authorized as part of the this environmental assessment. → p. **135**

Recommendation 25 – The Panel recommends that the proponent submit a residual matter management plan to the Ministry of Sustainable Development, Environment and Parks as part of this environmental assessment. → p. **135**

Seismic risk

Recommendation 26 – The Panel recommends that discussions take place between the Ministry of Sustainable Development, Environment and Parks and Transport Canada so as to identify, at the environmental assessment stage of the project, which government authority will ensure that earthquake risks are correctly taken into account in design of the LNG terminal. → p. **141**

Evaluation of technological risks

Recommendation 27 – The Panel recommends that the Ministry of Sustainable Development, Environment and Parks and Transport Canada ask the proponent to conduct, as part of this environmental assessment, an analysis for risks linked to the presence of the gas pipeline in the LNG terminal project study zone that will take into account potential cumulative effects. → p. **144**

Recommendation 28 – The Panel recommends that the proponent update his technological risk assessment for the projected LNG terminal and submit it to Transport Canada and to the Ministry of

Sustainable Development, Environment and Parks as part of this environmental assessment. This updating should take into account the proponent's technical revision of the project and the various recommendations of the Panel. → p. **145**

Recommendation 29 – The Panel recommends that, before an LNG tanker approach route to the LNG terminal south or north of île Rouge is established, Transport Canada take into account the environmental impacts in addition to the safety aspects. → p. **147**

Emergency measures planning

Recommendation 30 – The Panel recommends that, in addition to the warning systems planned for the Gros Cacouna peninsula trails and the municipality of Cacouna, the proponent establish a place for workers at the Port of Gros-Cacouna. In addition, warning systems established in cooperation with the municipal authorities of Notre-Dame-des-Sept-Douleurs and Les Escoumins should be planned. → p. **157**

Recommendation 31 – The Panel recommends that the proponent implement an annual public information mechanism for people who could be affected by a technological accident at the LNG terminal or on an LNG tanker. → p. **157**

Recommendation 32 – The Panel recommends that in case of an earthquake of a magnitude above or equal to the return period of 475 years, the emergency measures plan should be activated so that the authorities responsible for civil safety, at the municipal and provincial levels, are informed of the status of the situation, even if there is no liquefied natural gas leak. → p. **158**

Recommendation 33 – Since Transport Canada is owner of the Gros-Cacouna Harbour facilities, the Panel recommends that that department should ensure that an emergency environmental plan is prepared for the LNG terminal project in accordance with the *Environmental Emergency Regulations*. → p. **158**

Construction monitoring

Recommendation 34 – The Panel recommends that the monitoring program be developed by the proponent as part of the environmental assessment of the project. → p. **159**

Recommendation 35 – The Panel recommends that a public advisory committee be established to respond to the concerns of the public. This committee would comprise citizens, the proponent, a representative of the municipality of Cacouna, a representative of the Government of Canada, and a representative of the Government of Quebec, and that it be financed by the proponent for the duration of the construction work. The results of monitoring should be public. → p. **159**

Environmental follow-up during operations

Recommendation 36 – The Panel recommends that the proponent, in partnership with the Centre local de développement de la région de Rivière-du-Loup, participate in the assessment of the regional economic spinoffs of the project. → p. **160**

Recommendation 37 – The Panel recommends that the public advisory committee be maintained during operations. The monitoring results would be available to the public. → p. **160**

Decommissioning the site and the terminal

Recommendation 38 – The Panel recommends that the proponent complete the analysis of the environmental impacts of dismantling the terminal based on the terms of the lease reached with Transport Canada, as part of this environmental assessment. → p. **161**

Recommendation 39 – The Panel recommends that Transport Canada require that the proponent's lease contain a guarantee that the harbour lands used for construction would be rehabilitated as soon as construction of the LNG terminal is completed. → p. **161**

Introduction

The Cacouna Energy LNG terminal project is subject to the Quebec environmental impact assessment process as set out in Section 31.1 and subsequent sections of the *Environment Quality Act (*L.R.Q., c. Q-2), which provides for public participation. The project is also subject to an environmental assessment by the Government of Canada under the *Canadian Environmental Assessment Act* (L.C. 1992, c. 37, as modified), which also has provisions for public consultation. In this context, the project underwent a cooperative environmental assessment in accordance with the May 2004 *Canada-Quebec Agreement on Environmental Assessment*, hereafter called the "Agreement", which, among other things, provides for the possibility of creating a joint review panel when federal and provincial authorities require that a project be reviewed by an independent panel.

On the recommendation of Transport Canada and Fisheries and Oceans Canada, the two federal authorities responsible for issuing a permit for the proposed project, the federal Minister of the Environment decided, on August 19, 2005, to refer the project to a federal review panel pursuant to the *Canadian Environmental Assessment Act*. It should be noted that the project will also require a lease from Transport Canada as it is the owner of the Gros-Cacouna port area. On March 23, 2006, Mr. Claude Béchard, Minister of Sustainable Development, Environment and Parks for the province of Quebec, issued a mandate to the Bureau d'audiences publiques sur l'environnement (BAPE) to hold public hearings on the project pursuant to Section 31.3 of the *Environment Quality Act*. BAPE was also asked to establish a joint review panel, if circumstances warranted, in accordance with the Agreement.

In accordance with the provisions of the Agreement regarding the creation of a joint review panel, the president of the BAPE created the BAPE commission on March 29, 2006, and appointed the two members of this commission to the joint review panel. The federal Minister of the Environment, the Honourable Rona Ambrose, subsequently approved the appointment of these two members. The federal panel member, who joined the BAPE in order to create the joint review panel, was appointed by the federal Minister of the Environment on April 7, 2006, and by the president of the BAPE on April 10, 2006. At the end of this process, the Quebec Minister of Sustainable Development, Environment and Parks approved the appointment of the three members of the joint review panel.

The joint review panel created through the above process completed its work at the same time as the BAPE commission, following the BAPE's rules from the *Rules of*

Procedure relating the Conduct of Public Hearings [Q-2, r. 19]. The two panels' mandates began on May 8, 2006 with a duration of four months. As allowed for under the Agreement, it was decided to produce a joint report.

In September 2004, the Quebec Minister of the Environment (now the Minister of Sustainable Development, Environment and Parks), Transport Canada and Fisheries and Oceans Canada received a project description from TransCanada PipeLines Limited and Petro-Canada. After determining that the environmental impact report was acceptable, the Minister of Sustainable Development, Environment and Parks gave the BAPE the mandate to make the report public and to hold an information and public consultation period from February 22 to April 8, 2006. During this period, approximately thirty requests for a public hearing were sent to the Minister.

The first part of the public hearings was held in Rivière-du-Loup from May 8 to 11, 2006. Sixty-six briefs were presented during the second part of the public hearings, held in Cacouna from June 12 to 15, 2006. An additional twenty-five briefs were tabled but not presented, and two oral presentations were made.

Description of the Project

The proposed Cacouna Energy LNG terminal project is located in the Municipality of Cacouna, approximately 15 km north of downtown Rivière-du-Loup (Figure 1). The project involves importing liquefied natural gas (LNG) to supply natural gas to the North American market. It includes marine facilities for berthing ships that transport LNG at atmospheric pressure (LNG tankers), transfer facilities and land-based LNG storage and regasification facilities.

The marine facilities would consist of a wharf on piles, equipped with ice-deflecting barriers, for docking and unloading the LNG tankers. The wharf would be linked to land by a jetty, also on piles, approximately 400 m long (Figure 2).

Even though the wharf could accommodate a tanker with a capacity of 216 000 m^3, those anticipated will be in the range of 145 000 to 165 000 m^3. The LNG would come from liquefaction facilities located in Russia or the Middle East. An LNG tanker would arrive at the Cacouna terminal every four to eight days. After crossing the Atlantic, it would enter the Gulf of St. Lawrence, reach the estuary, and then follow the seaway to Les Escoumins. The LNG tanker would then head to the terminal, going around île Rouge either to the south or to the north (Figure 1). Tugboats would be used for arrival and berthing and for departure manoeuvres. The unloading of the LNG would take approximately fourteen hours.

The land facilities would include two double-walled LNG storage tanks, 79 m in diameter and 50 m high, with an approximate capacity of 160 000 m^3 each. The internal wall of the tanks would be composed of a nickel alloy resistant to the low temperatures of the LNG (-160 ^oC), and the external wall would be made of concrete. The floors and ceilings of the storage tanks would be made of reinforced concrete to ensure complete confinement. The facilities would also include equipment to reconvert the LNG into natural gas, a unit to produce nitrogen to be injected into the natural gas as needed so that it can be used as a fuel, piping for the transport of the LNG and natural gas, emergency disconnection devices, surveillance and control systems, an emergency diesel generator, etc. Finally, there will also be service and support buildings, access roads, and parking areas. The pipeline to connect the LNG terminal to the North American network is not part of the project, however, and its route, which is still to be defined, will be evaluated in the context of a separate environmental assessment.

The LNG terminal would produce some 500 million cubic feet of natural gas per day (cfgpd) (14.2 million cubic meters). Construction costs are estimated by the proponent to be $686 million (2004 dollars) and the total annual operating costs to be $25.2 million. The proponent expects to begin construction in January 2007 and commission the terminal in 2010.

The BAPE commission and the joint review panel, hereafter referred to collectively as "the Panel", was to have submitted a joint report to the federal Minister of the Environment and the Minister of Sustainable Development, Environment and Parks by September 8, 2006. However, on August 25, 2006, the proponent submitted modifications to the proposed marine and land facilities (Figure 2) as well as to certain construction methods. Although those modifications did not change the scope of the project and are part of the engineering process related to the proposed LNG terminal project, they were likely to affect certain conclusions of the Panel on matters such as ambient underwater and on-land noise, air quality, water quality of the St. Lawrence Estuary, marine wildlife and avifauna, landscape, and technological risks. A request to extend the Panel's mandate of inquiry and public hearing was therefore submitted to the Minister of Sustainable Development, Environment and Parks to allow the Panel to satisfy the requirements of the *Canadian Environmental Assessment Act* and the *Environment Quality Act*, as prescribed under the Agreement. On September 20, 2006, the Cabinet, on the advice of the Minister of Sustainable Development, Environment and Parks, extended the mandate of the BAPE until November 10, 2006[1].

The Panel sent new questions to the proponent and the experts in order to be able to complete its review, and invited individuals and groups to submit their observations

1. Decree 854-2006, *Gazette officielle du Québec*, part 2, October 11, 2006, p. 4896.

and comments on the modifications proposed by the proponent. About 20 comments were received by the Panel.

Review Framework

The BAPE commission reviewed the project from the perspective of sustainable development by applying the concept of environment held by the higher courts, which encompasses biophysical, social, economic and cultural aspects, for current and future generations. This concept of the environment is broad and includes the effects of human activities on the environment, life, health, safety, well-being, and comfort of the population, as well as other matters of interest to communities.

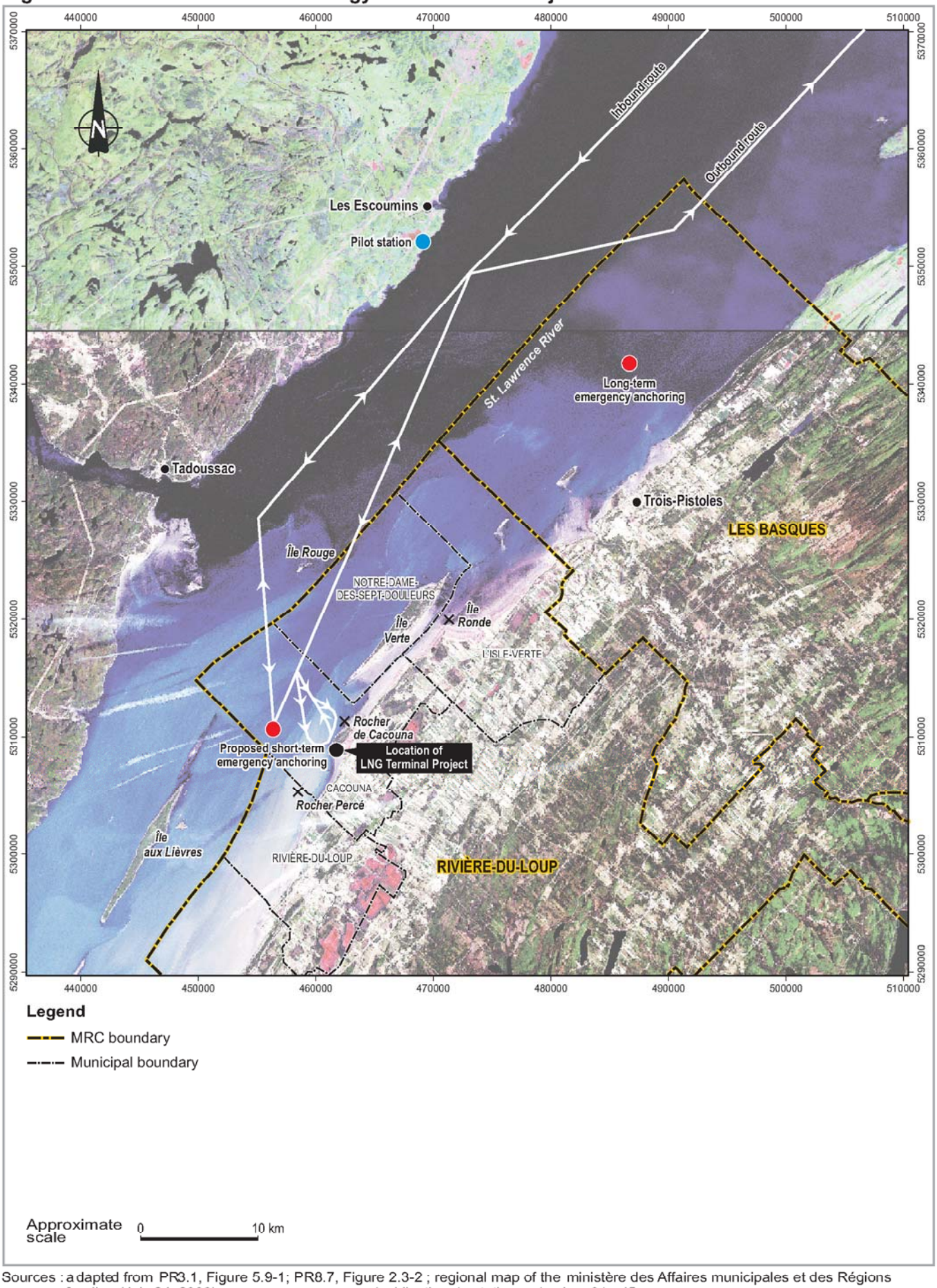
In addition, the joint review panel reviewed the project in accordance with the requirements of the *Canadian Environmental Assessment Act* and the *Environment Quality Act,* as stipulated in the Agreement. It therefore assessed the environmental effects of the project and their significance, including those caused by accidents and malfunctions, and the cumulative environmental effects that the project could cause when combined with the effects from other works, projects or activities, taking into account measures to mitigate these effects. Finally, the reason for the project, the feasible alternatives, and the need for a follow-up program were part of the review, as well as the capacity of renewable resources to meet current and future needs.

The Panel completed its review of the project using the information contained in the file assembled by the joint environmental assessment committee. This committee, created in accordance with Section 10 of the Agreement, has the responsibility to manage the environmental assessment and to ensure that all relevant and necessary information needed to satisfy the requirements of the *Canadian Environmental Assessment Act* and the Quebec *Environment Quality Act* is obtained and taken into consideration. The Panel also based its review on the information and documentation tabled during the public hearings and from its own research.

In its report, the Panel has provided findings, opinions, and recommendations. A finding means a fact, an opinion means the Panel's view, and a recommendation means an action proposed by the Panel.

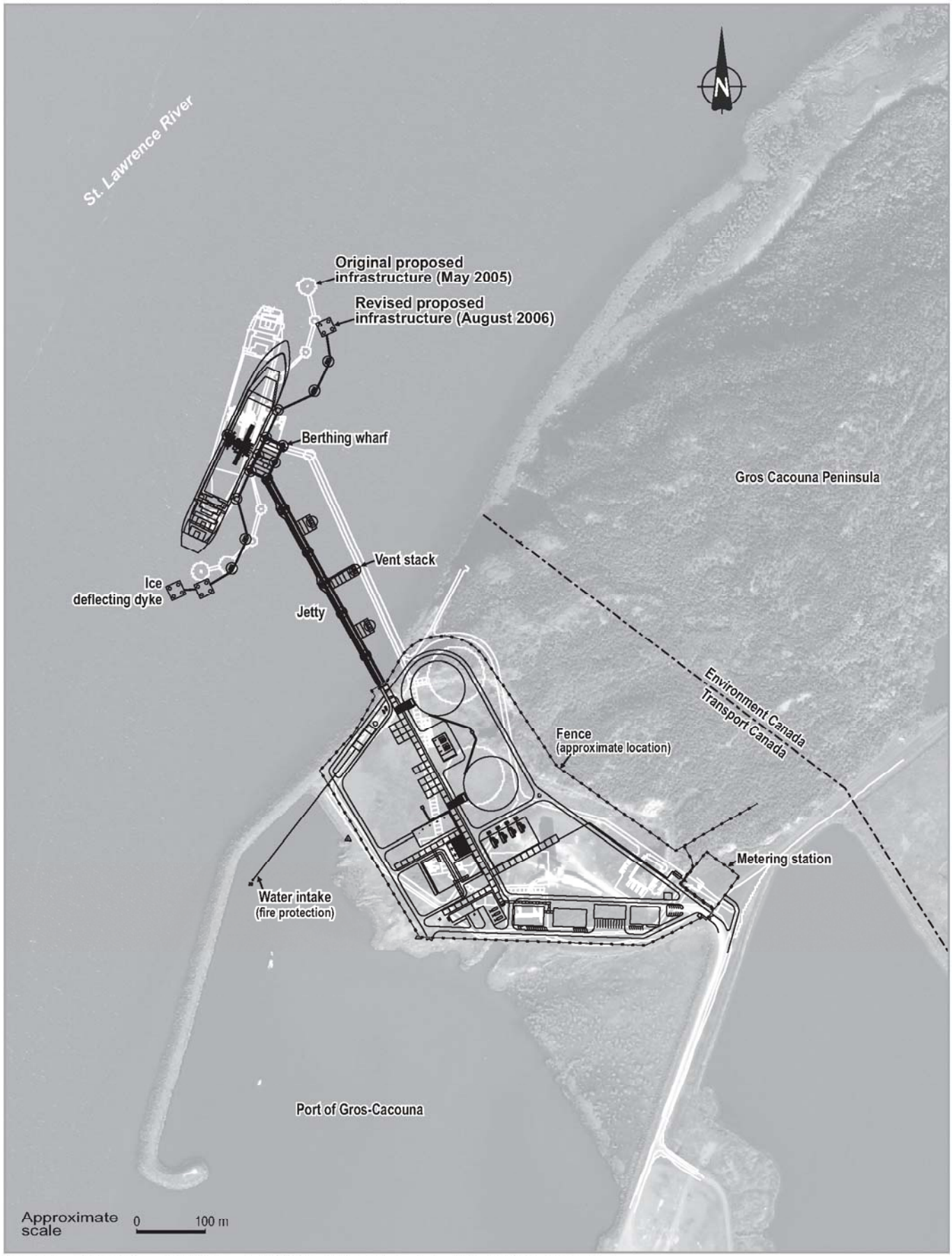
In particular, the Panel reviewed the issue of public safety, taking into account the concerns of the neighbouring population, and paid specific attention to the integration of the project into the natural and human environment. To this end, the sixteen principles of sustainable development, as explained and defined in the Quebec *Sustainable Development Act* (L.R.Q., c. D-8.1.1), which exist to orient the actions of the government, also guided the Panel.

Figure 1 Location of Cacouna Energy LNG Terminal Project



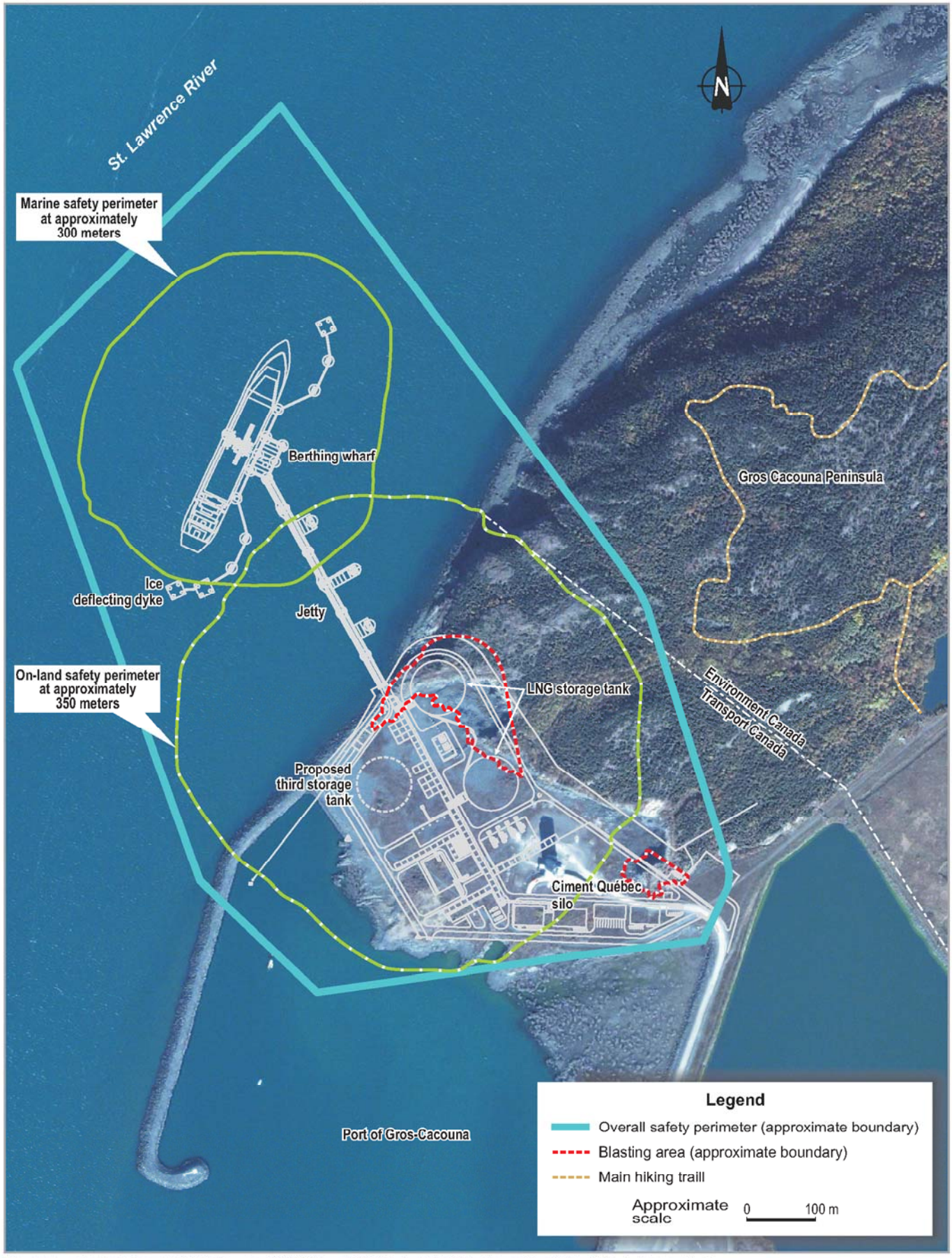
Sources : adapted from PR3.1, Figure 5.9-1; PR8.7, Figure 2.3-2 ; regional map of the ministère des Affaires municipales et des Régions [on-line (July 24, 2006) : www.mamr.gouv.qc.ca/publications/cartotheque/region_01.pdf].

Figure 2 Changes to project design (August 2006)



Sources : adapted from PR8.7, Figure Q-029-1 ; DA46.2, Figure 6 ; DB8 ; DQ1.1, Appendix 1.

Figure 3 Planned facilities and safety perimeter



Sources : adapted from PR8.7, Figures Q-023-2 and Q-029-1 ; DA46.2, Figure 6 ; DB8 ; DQ1.1, Appendix 1.

Chapter 1 Concerns and opinions of participants

The public hearings on the Cacouna Energy Liquefied Natural Gas (LNG) Terminal Project attracted a great deal of participation. Many individual members of the public, groups and corporations shared their analyses, opinions, interests and concerns on the subject with the Panel. Here, the Panel sets out what it read and heard. This is not an exhaustive account, given the extent and diversity of positions contained in the briefs, responses, and oral presentations. It presents the various visions of development, of both project opponents and supporters, as well as criticism of the environmental assessment process. The Panel also summarizes the concerns regarding the project's justification and its impacts. Lastly, it presents the solutions of participants who wish to minimize the impacts of the project on the natural, human and social environments.

Two development visions

A referendum on the project was held in the village of Saint-Georges-de-Cacouna in September of 2005. A majority of 57.2% of voters were in favour of the project.

Opponents to the LNG terminal project

Some participants were concerned about the project's negative effects on the region's economy, quality of life, human health, natural environment and resident safety (Ms. Nancy L. Ramsay, DM6, p. 1; Vision Cacouna, DM67, p. 4). The Corporation de développement de Saint-Germain-de-Kamouraska stated the following:

> […] not only are our regions not developed in a sustainable fashion, but we are endangering the main resource that is seen right now as the basis for the new regional economy: the increasing appeal of natural sites and their way of life for urban populations.
> (DM24, p. 5)

Another participant wanted the project to be assessed according to the long-term impacts that it could have on the population:

> We must look at the current Grand-Cacouna through the eyes of a child who, in 20 years, will have to live with the consequences of our decisions, while the great

> majority of the participants at the information sessions will either be dead or in long-term care facilities.
> (Ms. Lucille Bouchard, DM14, p. 2)

Some opponents voiced their displeasure with the process within which the referendum was held. Some criticized the fact that the residents of the Saint-Georges-de-Cacouna Parish were not allowed to vote, while others did not approve of the behaviour of the municipal elected representatives and the proponent in the days leading up to the vote (Ms. Denise Beaulieu, DM34, p. 1; Ms. Jeanne Maguire, DM59, p. 8; Mr. Guy Beaulieu, DM33.1, p. 1 and 2). Moreover, the results of the referendum were controversial:

> Having just recently graduated, I tend to believe that I never passed an exam with a result of 57.2%. I understand that we are not in school, but this result shows the division that exists and doesn't demonstrate the population's approval.
> (Commission jeunesse du Bas-Saint-Laurent, DM88, p. 4)

And the timing was also controversial:

> The referendum should have been held once all the studies had been completed, including the route of the pipeline and the final BAPE report, in order to give citizens the chance to express themselves on the entire project, and not only on monetary aspects.
> (Ms. Josée Boudreau, DM76, p. 7)

Project supporters

Project supporters believe that Quebec must diversify its natural gas supply sources, regardless of the site chosen to construct an LNG terminal. One of them mentioned that this type of facility would improve Quebec's supply and lessen its dependence on Western Canada (Association des consommateurs industriels de gaz, DM3, p. 1). In such a context, Quebec-based industries would benefit from competitive prices for this energy source:

> A reliable and long-term access to […] petrochemical feedstock is essential to maintaining and developing a competitive petrochemical industry in Quebec, while making investments in our industrial sector appealing. We therefore support the construction of LNG terminals to […] enable our industrial sector to grow steadily, as petrochemicals are both a key to, and an added-value sector in Quebec's economy.
> (Canadian Chemical Producers' Association, DM1, p. 1)

Regionally, the project is seen as an economic development tool that is likely to help keep young people in the region (Regroupement des citoyens et citoyennes en faveur du port méthanier, DM63, p. 3). The Municipality of Cacouna hopes that it will

stimulate job creation and wealth, and encourage the development of other industries locally:

> Moreover, we believe in the industrial cluster effect, which will foster the development of new support-service businesses in Cacouna and in the MRC of Rivière-du-Loup by drawing upon new regional skills based on port and distribution activities, which will enable our region to stand out from other Quebec regions and Eastern Canada. This LNG terminal will be our large-scale infrastructure that will provide us with this leverage.
> (DM16, p. 12)

A community divided

Despite the referendum result, the community remains divided, as opposing positions and development visions face off. Some female residents revealed that individuals who had submitted petitions on the first evening of the public hearing had been named and ridiculed the next morning by radio hosts. In their opinion, certain Rivière-du-Loup merchants who are opposed to the project fear reprisals if they speak up (Mses. Michelle Chamard and Marie-Josée Henry, DM70, p. 13). In relation to this, another participant added:

> I was saddened to see, after meeting the people from Cacouna and taking part in various demonstrations concerning the project, the extent to which human relationships had been compromised. There were acts of vandalism, threats, intimidation and everyone is experiencing an immense amount of stress.
> (Ms. Cynthia Calusic, DM5, p. 1)

According to the Centre de santé et de services sociaux de Rivière-du-Loup, a united community has a better chance of remaining healthy. Work to reunify the community is therefore required, whether the project proceeds or not (DM62, p. 5).

The environmental assessment process

Some public hearing participants were unhappy with the environmental assessment process. Some criticized what they saw as a project already approved by the government, without consideration for the public hearing process (Corporation des propriétaires de l'île pour la conservation de l'île Verte, DM37, p. 9; Mses. Michelle Chamard et Marie-Josée Henry, DM70, p. 3).

An impact assessment methodology that was criticized

The proponent's environmental assessment methodology was criticized. One participant believed that the approach:

> […] renders the safety risks and the protection of the environment negligible by incorporating them into a virtual approach, which mitigates, minimizes, […] and makes them appear null and without consequence. This approach strives to win the public's trust and reassure governments, even if the impacts are cumulative, residual and harmful in nature.
> (Mr. Gérard Michaud, DM29, p. 8)

Moreover, the Agence de la santé et des services sociaux du Bas-Saint-Laurent criticized the compartmentalized approach to risk assessment. In this respect, it recommended the creation of "a working group on this subject, made up of the main concerned stakeholders and some experts if necessary" (DM22, p. 3). This group would validate the natural disaster scenarios, and would look at possible consequences for the population as well as the main security measures (*ibid*.).

Exclusion of the gas pipeline and transmission line

Some participants were critical of the fact that the project excluded both the gas pipeline and the electrical transmission line required to operate the LNG terminal. They believe that these two elements are part and parcel of this project, as the terminal could not operate without them: "If there's LNG at Cacouna, it will surely have to go somewhere!" (Ms. Élise Marquis, DM20, p. 6). Agricultural producers believed that a report from the BAPE that is favourable to the construction of the LNG terminal would be the equivalent of approving the gas pipeline without having seen the route and without knowing the related impacts (Mr. Gérard Michaud, DM29, p. 6; Comité ZIP du sud de l'estuaire, DM25, p. 3; Mr. Gaston Hervieux, DT14, p. 45 and 46; Fédération de l'UPA du Bas-Saint-Laurent, DM23, p. 3).

A generic hearing on LNG terminals

Nature Québec/UQCN wanted the environmental assessment process to facilitate the comparison of the pros and cons of the proposed Rabaska and Cacouna Energy LNG terminals, in order to keep only one of them. They also suggested combining the mandates of the Panels for these projects and including the collective project components (DM74, p. iv and 15). According to them:

> Only one of the LNG terminals currently proposed for Quebec would be appropriate to ensure supply for the foreseeable future, taking into account possible constraints associated with supply from Alberta.
> (*Ibid.*, p. 15)

Another organization also objected to this piecemeal approach and wanted meaningful consideration of the project justification (Corporation des propriétaires de

l'île pour la conservation de l'île Verte, DM37, p. 8). The Conseil régional de l'environnement du Bas-Saint-Laurent proposed the following: "we recommend there be a comprehensive review of the role of these projects in both the Quebec and the continental energy context, and of the costs and benefits to Quebec" (DM47, p. 29). The Amis de la vallée du Saint-Laurent would like the Government of Quebec to hold public hearings and define a policy on the importation and use of natural gas in Quebec, before the implementation of the program to investment in the energy sector which is contemplated in the Quebec Energy Strategy 2006-2007 (*La stratégie énergétique du Québec 2006-2015)* (DM65.1, p. 5).

Lastly, there was also criticism of the fact that the report resulting from the "Technical Review Process of Marine Terminal Systems and Transshipment Sites" (TERMPOL) will be completed after the mandate of the Panel, so the Panel will be unable to consult it before tabling its own report. "For the members of the Corporation des propriétaires de l'île pour la conservation de l'île Verte, it is unacceptable that the Panel will be unable to review these critical issues with the concerned authorities" (DM37, p. 13).

The purpose of the project

The purpose of the project and certain choices of the proponent resulted in several comments from participants at the hearings.

The demand for energy

For some participants, Quebec relies mainly on a supply of natural gas from Western Canada. In their view, this situation interferes with healthy market competition at a time when natural gas is used a great deal by businesses. They therefore want natural gas supply sources to be diversified, and better access guarantees to this resource through long-term agreements. They think this would generate competition that would result in better prices (Mr. Denis Ouellet, DM12, p. 3; TransAlta, DM26, p. 1; Table de concertation de l'industrie métallurgique du Québec, DM55, p. 4). In this respect, the Fédération des chambres de commerce du Québec underscored that "The expected growth rate in the demand for natural gas in the coming years point to higher prices" (DM28, p. 1).

The Table de concertation de l'industrie métallurgique du Québec believes that the import of LNG represents a strategic choice:

> The companies, labour unions and organizations of Quebec's metallurgy industry believe that this choice […] would contribute to the longevity of plants here in Quebec, attracting new investment, and stimulating regional economic development.
> (DM55, p. 7)

The Canadian Gas Association (CGA) went even further by stating that using natural gas "is part of a rational strategy based on the principle of choosing the best source of energy for the planned use" (DM15, p. 2). For its part, the Fédération des chambres de commerce du Québec wants Quebec to take its place on the natural gas market, given its favourable geographic location: "Introducing LNG into Quebec will help meet not only our own future needs, but also the needs of other provinces and the neighbouring American market" (DM28, p. 14).

These arguments justifying the project raised a few eyebrows, however:

> […] Barely two years ago, […] Gaz Métropolitain and Hydro-Québec were proposing to build a natural gas-fired power plant at Beauharnois, without talking about an LNG terminal, meaning that the gas supply seemed sufficient to meet the needs of this plant. How is it that today, without this power plant, […] we are short of gas to such a extent that an LNG terminal is now so important?
> (Parti vert du Canada pour la circonscription de Montmagny, L'Islet, Kamouraska et Rivière-du-Loup, DM86, p. 2)

Some participants doubted that Quebec is vulnerable in terms of natural gas supply, or thought that an increasing reliance on costly and coveted energy sources would tend to reduce security (Regroupement national des conseils régionaux de l'environnement du Québec, DM64.1, p. 7 and 8; Équiterre, DM72, p. 7).

The Regroupement national des conseils régionaux de l'environnement du Québec did not think that an LNG terminal would increase the availability of the resource and result in lower prices, as the proponent will not be obligated to supply the Quebec market (DM64.1, p. 8). It also added that:

> A 2% increase in gas demand in the American market over the next 10 years could result in markedly higher sales volumes than those in Quebec.
> (*Ibid.*, p. 7)

It recognized the economic advantage offered by Quebec's geographic location for development of an LNG terminal, but proposed instead "to negotiate import agreements with the proponents of projects located in the Maritimes and on the Eastern coast of the United States" (*ibid*.).

A company not yet created

The fact that the company which will own the LNG terminal does not yet exist provoked numerous comments. One participant was worried about the consequences of the *Loi concernant la municipalité de Cacouna*, recently passed by the National Assembly, which links the municipality to Cacouna Energy (Mr. Nelson Landry, DT8, p. 40). Others criticized the fact that a project of this size does not have a legal owner: "We're talking about a multi-million dollar project and we don't even know who the operator will be who will have to answer for their actions at the end of the day" (Émond-Paradis Family, DM66, p. 3).

Site selection

Selecting the port of Gros-Cacouna as the site for development of an LNG terminal was supported by some and criticized by others. For example, one participant highlighted the fact that the site has the major advantage of being accessible to ocean-going ships without needing to perform expensive dredging operations (Breton, Banville et Associés, DM7, p. 11). Another believed that this site has several advantages, including direct access to highway 20 without having to go through any residential zones; being bordered by an industrial zone; and being able to accommodate an LNG terminal without major changes to the current landscape as the deep water port already exists (Chambre de commerce de la MRC de Rivière-du-Loup, DM35, p. 5).

In addition to benefiting from the presence of the port, development of an LNG terminal would ensure the continuation and profitability of existing infrastructure (Chambre de commerce de la MRC de Rivière-du-Loup, DM35, p. 5; Ville de Rivière-du-Loup, DM60, p. 5).

The Municipality of Cacouna testified to the chronic under use of its port and its industrial zone (DM16, p. 11 and 12). The dock workers at the port stated that "90% of the payroll comes from other ports" (Mr. Damien Dubé, DT10, p. 46). One business went even further:

> For many years, the population of Saint-Georges-de-Cacouna has fought hard to end its collective impoverishment. It has seized upon the deep water port and its adjacent industrial park as a lifeline that can guarantee its survival and the survival of coming generations.
> (Entreprise Form-Éval inc., DM2, p. 13)

According to the MRC of Rivière-du-Loup, this deep water port represents an important lever for the economic development of the region (DM45, p. 3). The

Commission de développement du parc portuaire de Gros-Cacouna believed that the operations of the LNG terminal would stimulate new local services, and could be part of offering comprehensive maritime services at the port. This could revitalize the level of activities "by encouraging the development of new traffic. A feasibility and profitability study for a coastal shipping project between the port of Gros-Cacouna and the north shore of the St. Lawrence was done from this perspective" (DM17, p. 5). The Commission also believes it is important that the security perimeter of the LNG terminal not hinder the regular activities of the port, and that the coexistence of the port's activities and those of the LNG terminal be ensured (*ibid.*, p. 3).

Some participants thought that the underutilization of the port represents an opportunity to exploit. Their viewpoint was that "the solution would be to cede it to the Municipality of Cacouna, which could then convert it into a regional marina. It would become a major tourism centre, and by the same token, a strategic centre for our region's economy" (Mr. Bertrand Gaudreau, DM53, p. 2).

One resident believed the site of Cacouna to be unsuitable given certain sensitive elements, specifically the landscape, the presence of diverse wildlife and the proximity of the marsh (Mr. Yvan Roy, DM75.1, p. 5 and 6). Another resident noted the following:

> […] the best relative location is not the answer to the question "Is the site suitable for a proponent's given project?", but rather, "Is such a project suitable for a site that has certain specific characteristics?" I don't think that these questions are asked with respect to LNG terminals.
> (Mr. Pierre Larochelle, DT8, p. 38)

The Conseil régional de l'environnement du Bas-Saint-Laurent is of the view that the port of Gros-Cacouna should not be considered as a potential site for industrial activities such as LNG terminals because of the exceptional biodiversity in the project study area, as well as the presence of several species of cetaceans and birds and their habitats, which are currently environmentally stressed (DM47, p. 19).

Local gas delivery

Some project supporters believed that building an LNG terminal in the region would foster a regional delivery of natural gas that would otherwise be impossible, which in turn would induce industries to set up operations in the region and encourage competition for those already present (Chambre de commerce de la MRC de Rivière-du-Loup, DM35, p. 5 and 8; Centre local de développement de la région de Rivière-du-Loup, DM21, p. 12 and 13). Moreover, the City of Rivière-du-Loup:

> […] considers the access to natural gas to be a major economic advantage to develop its industrial park. Delivery to the industrial park of Rivière-du-Loup therefore represents an essential condition for supporting the project.
> (DM60, p. 6)

However, the Comité de recherche et d'intervention environnementale du Grand-Portage considered access to natural gas for the region of Rivière-du-Loup to be uncertain, because the construction of a distribution network would depend upon another company and that "such a demand is difficult to imagine in a region that has barely 33,000 inhabitants" (DM49, p. 17).

Moreover, the possible addition of infrastructure to the LNG terminal resulted in some opposition. This was the case for the possible construction of a cogeneration plant, to which the City of Rivière-du-Loup is formally opposed (DM60, p. 3 et 7).

A possible third LNG tank, while the project presented only has two, also resulted in some opposition (Ms. Élise Marquis, DM20, p. 6).

Anticipated impacts

Many negative impacts, both on the human and biophysical environment, as well as on the regional economy, were mentioned by participants at the hearings.

Impacts on the human environment

Many participants from the île Verte and the surrounding Cacouna region were worried about the possible adverse effects that an LNG terminal could have on their quality of life, their health or their safety.

Quality of life

One participant was worried that living in a healthy and quiet environment would be difficult in proximity to an LNG terminal "because stress, worry, fear, noise and pollution will become part of our daily lives" (Mr. Jean-Guy Allard, DT13, p. 52). He believed that such a project should be remote from all populated areas and especially not located along the St. Lawrence estuary (*ibid*.).

One participant underscored a social equity problem: "the majority of expenditures made to construct the LNG terminal would be to aquire goods and services from outside Quebec, […] while all hazards, inconveniences and drawbacks will be localized in Quebec" (Mr. Claude Rioux, DM79, p. 12).

Residents of Île Verte described their community as an exceptional environment of great beauty that contributes greatly to their quality of life:

> It's hard to formulate the recipe for happiness. It requires balance and a skilful mix planned over centuries and brought about by various forces, but it seems that, as if by magic, several of these ingredients are here on this island. However, the magic is fragile, and that it mustn't be treated harshly; rather, it must be recognized and nurtured, its fleeting presence welcomed.
> (Corporation des propriétaires de l'île pour la conservation de l'île Verte, DM37, p. 5 and 6)

Air quality

The degradation of air quality and its health impacts following construction of the LNG terminal were part of the concerns expressed (Mr. Michel Dionne, DM69, p. 1 and 2; Mr. Philippe Bélanger, DM87, p. 1). According to the l'Agence de la santé et des services sociaux du Bas-Saint-Laurent, while the proponent's simulations on air emissions seemed to comply with regulations, compliance doesn't guarantee the absence of hazards or impacts on the health of citizens concerned (DM22, p. 1). Other participants underscored the fact that "being owners of au Bout d'en Haut de l'île [Verte], we will be exposed to environmental toxins due to the prevailing winds in the summertime" (Émond-Paradis Family, DM66, p. 7).

Managers of a centre for spiritual renewal located at Cacouna fear that if the air quality noise levels deteriorate, this will have a major negative effect on their clientele (Mr. Jocelyn Guimond, DM77, p. 18).

Noise nuisance

The proponent's noise level assessment for the construction and operation phases of the LNG terminal was criticized by some participants:

> […] we will hear all the construction, blasting and operating noises even if the figures over 12 hours state the opposite. […] Using such calculations, a Boeing 747 could take off in front of our house and I wouldn't hear it because as the take-off noise averaged over 12 hours will result in an A-weighted decibel level that is lower than the current ambient noise!
> (Mr. Gilles Nadeau, DM30, p. 2)

One participant believed that the noise nuisance was grossly underestimated by the proponent. The meteorological parameters used were thought to be inadequate and "this would explain why the results obtained by the proponent do not correspond at all with what the local residents observe" (Mr. Bruno Vincent, DM54, p. 15). For others:

> It is simply ridiculous, and even insulting, to be told that we wouldn't hear the LNG tankers, tugboats or the blasting when, on fine days, we can hear a seal or a beluga whale breathing at several nautical miles from our shores.
> (Corporation des propriétaires de l'île pour la conservation de l'île Verte, DM37, p. 15)

The landscape

Many factors related to impacts on the visual landscape were raised at the hearings. These aspects included light pollution and the integration of the facilities into the landscape. According to one resident of Cacouna, the landscape is part of his life and it has an economic value from the standpoint of both tourism and quality of life (Mr. François Rochon, DT14, p. 57). Some criticized the project as going against the current trend of preserving and enhancing the human landscape, within the context of sustainable development (Ms. Lynda Dionne and Mr. Georges Pelletier, DM32, p. 18; Ms. Jeanne Maguire, DM59, p. 3). Another participant added the following:

> It therefore becomes crucial to preserve, protect and enhance the landscape of Quebec within the context of sustainable development. These actions must be taken collectively, with the involvement of every community stakeholder.
> (Mr. Pierre Cambon, DM51, p. 10)

The mitigation measures proposed by the proponent were not unanimously accepted. This was the case, among others, for measures concerning the landscape integration of the storage tanks: "You would have to be short-sighted to not see them, even if they are painted with the proper colour. The planting of trees would be practically ineffective, as most are bird's-eye view" (Ms. Jeanne Maguire, DM59, p. 4).

The Conseil des monuments et sites du Québec believed that such a project required the government to impose strict study requirements, and that it monitor the situation closely. "We noticed the lack of thoroughness used to analyze heritage resources, and the lack of data regarding visual impacts" (DM36, p. 1 and 2).

Safety consideration associated with terminal and navigation

The risks of technological accidents were broadly discussed by many participants. Greenpeace Quebec underscored the inherent dangers of an LNG leak for the population (DM80.1, p. 13). Some residents thought that the Canadian standard covering this aspect (CSA-Z276-01) is obsolete (Mses. Michelle Chamard and Marie-Josée Henry, DM70, p. 7). The Conseil régional de l'environnement du Bas-Saint-Laurent believed that the current site for the LNG terminal should meet the strictest international safety standards (DM47, p. 36).

Some participants complained about the lack of openness shown by the proponent and about the way they answered questions. For example, the Centre de santé et de services sociaux de Rivière-du-Loup noted that “this apparent closed-mindedness, when faced with legitimate questions, threatens the effectiveness of the cooperative efforts to be undertaken to ensure the safety of the population should the project go shead” (DM62, p. 2). One resident considered that he did not receive an answer to his questions concerning the risks he is subjected to:

> Relative to the question I asked, “What is the minimal distance required for me to remain healthy, without any injuries of any kind, i.e. at 1.6 kW/m^2?", I did not receive an answer, except that I would have 30 seconds to flee, but flee up to what distance?
> (Mr. Gilles Nadeau, DM30, p. 2)

Furthermore, the risk assessment methodology used by the proponent was questioned by the Agence de la santé et des services sociaux du Bas-Saint-Laurent, who believed that this method “did not allow the average person to understand either the nature, or the scope of the consequences resulting from a possible major industrial accident. It also does not allow the main stakeholders involved to properly prepare for such a disaster” (DM22, p. 2).

Safety concerns related to navigation were also raised by some participants. One of them thought it risky that LNG tankers would take the channel passing to the south of île Rouge: “Doesn’t the possibility of trips by 300 m tankers in a zone that is riddled with shoals remind us of the initial reason for installing the first lighthouse on the St. Lawrence on île Verte in 1809?” (Mr. Denis Michaud, DM38, p. 6).

However, the Société de développement économique du Saint-Laurent believed that “commercial ships are also equipped with sophisticated technology which guarantees the safety of the trip until the merchandise is unloaded” (DM81, p. 5).

Safety on île Verte

Public safety and the limited means available to île Verte residents to deal with a disaster worried the Municipality of Notre-Dame-des-Sept-Douleurs, which intends to request the resources needed for additional public safety measures, including the evacuation of its sick and wounded (DM56, p. 3 and 5). The Comité de santé de l’île Verte requested, for its part, a quick and safe access to the dock of Cacouna at any given time. Should this prove impossible, it would demand from the proponent or from Transport Canada an evacuation service at low tide (DM39, p. 3).

The situation of the island residents presents certain challenges in terms of transportation, and in their view, it would risk becoming more complicated with the

advent of an LNG terminal and its related security measures. The islanders benefit from an ice-bridge during winter, which provides them with access to the south shore of the St. Lawrence:

> How could the proponent ever compensate the island residents should the ice-bridge disappear? How could the loss of freedom and autonomy provided to the community by nature free of charge for over 200 years, be compensated for.
> (Messrs. Denis Cusson and Gérald Dionne jr, DM40, p. 5)

Recreational activities

For some, an LNG terminal at Cacouna could impact the region's recreational activities. The Fédération québécoise du canot et du kayak and the Route bleue du sud de l'estuaire were concerned that the 350 m security perimeter required around a docked LNG tanker would force kayakers to journey more than 650 m offshore to circumvent it. "This constraint could prove to be difficult and have serious consequences for the safety of kayakers" (DM11, p. 10). In addition, according to the Federation this detour could have repercussions on the planning of kayaker travel itineraries, who would avoid this portion of the circuit (*ibid.*, p. 12).

One user of the Gros Cacouna peninsula was concerned that the presence of the LNG terminal would close off access to a sizeable portion of the mountain because of its security perimeter, which would take away the value of that location (Mr. Julien Soucy-Thiboutot, DM27, p. 1).

The Club des ornithologues du Bas-Saint-Laurent believed that the noise emitted by the facilities could hinder the practice of their leisure activity. "A big part of bird identification isby their songs. Those who are not very loud, such as the Nelson's Sharp-Tailed Sparrow and the Yellow Rail, […] would be less audible and would risk being undetected" (DM61, p. 7).

Economic impacts

Some participants believed that development of the project would only result in limited economic impacts and few jobs. "A Normandin restaurant would result in the same number of jobs and, furthermore, investing in tourism is more profitable over the long term" (Vision Cacouna, DM67, p. 7). The Comité de recherche et d'intervention environnementale du Grand-Portage inc. noted that municipalities and the government would have to support the new costs and responsibilities linked to the new infrastructure, and ultimately other economic sectors, such as tourism, could suffer greatly (DM49, p. 16 à 18).

The Corporation de développement de Saint-Germain-de-Kamouraska believed that the future of regions is not in heavy industry, but rather in developing the unique characteristics of each, and in creating local namebrands and market niches (DM24, p. 5).

Some residents were worried about the project's impact on the value of their properties. According to one participant, the environment of a property has a given value, and changing its characteristics would result either in a loss of value or in a slowdown in the rise of its value (Mr. Claude Rioux, DM79, p. 20). Another participant stated that if the project goes ahead, a fund should be set aside to compensate owners and purchase the residences located close to the site (Mr. François Rochon, DT14, p. 62).

The Municipality of Notre-Dame-des-Sept-Douleurs thought that property values and tourism would suffer as a result of the presence of the LNG terminal (DM56, p. 2). According to one participant, the project would bring about the slow death of the region:

> If the landscape and environment are modified that much, we fear that this could drive away tourists who seek pristine and peaceful places to take part in various activities (biking, walking, kayaking, etc.). The businesses which were created this year are all linked to the tourism sector.
> (Ms. Cynthia Calusic, DM5, p. 2)

Some believed that the project would lessen the region's attraction for ecotourism (Ms. Caroline Mongeau, DM19, p. 1; Corporation des propriétaires de l'île pour la conservation de l'île Verte, DM37, p. 11; Mr. Denis Michaud, DM38, p. 4).

The Corporation du port de plaisance Gros-Cacouna remarked that building a LNG terminal would compromise recreational tourism projects such as a marina, as the space required lies within the planned security perimeter (DM84, p. 1). "In the future, it would be an example of what not to do for every other municipality: become a gigantic industrial park and the region's ghetto" (Ms. Lynda Dionne and Mr. Georges Pelletier, DM32, p. 18). According to the Association touristique régionale du Bas-Saint-Laurent, the proponent would have to plan for financial compensation to tourism companies in the Cacouna area, especially during construction (DM43, p. 4).

Some participants worried about the dismantling of the infrastructure at the end of its useful live. "Who will pay to clean up and restore the site? We have not been made aware of the creation and financing of a trust which will fund these expenses" (Émond-Paradis Family, DM66, p. 6). According to the Conseil central du Bas-Saint-Laurent, a plan to dismantle and close the facilities and then restore the land should

be an integral part of the project, and the proponent "should also take into account the restoration of wildlife habitat which may have been altered" (DM41, p. 12).

Some participants noted the importance of the economic benefits that the LNG terminal would generate. They hoped that the jobs created and the tax revenues would have a long-term positive financial effect for the region (MRC des Basques, DM4, p. 1; Regroupement des citoyens et citoyennes en faveur du port méthanier, DM63, p. 3).

The Municipality of Cacouna noted that it would receive annual indexed payments from Cacouna Energy over 40 years. Fees would also be paid to the school board in order to support educational institutions. According to the municipal organizations, "this new financial support will help improve municipal facilities and services, as well as offer an improved lifestyle to residents" (DM16, p. 14).

One organization wanted to maximize the regional content of the project with respect to hiring and subcontracting. It requested that jobs linked to both construction and operation be filled by people from the region, and that the proponent subcontract with regional businesses (Conseil central du Bas-Saint-Laurent, DM41, p. 17).

A suggestion was also made to create a regional committee, in partnership with the proponent, in relation to the project's economic benefits "to maximize the economic benefits to the Lower St. Lawrence during the construction phase" (Conférence régionale des éluEs du Bas-Saint-Laurent, DM57, p. 5).

The construction and operation of an LNG terminal were perceived by some as an opportunity to learn new skills and maintain acquired knowledge (CIMA+, DM18, p. 4; Association des constructeurs de routes et grands travaux du Québec, DM10, p. 4; Inspec-sol, DM58, p. 5). One educational institution wanted to define new niches related to natural gas distribution, in order to support companies wanting to use this type of energy (Commission scolaire de Kamouraska–Rivière-du-Loup, DM8, p. 4). For its part, the Institut maritime du Québec perceived the presence of an LNG terminal as an opportunity to make on-the-job training available on board LNG tankers to provide Canadian officers with the opportunity to become part of this specialized niche that is experiencing strong growth (DM9, p. 6 et 9).

For one participant, an LNG terminal represents an advantage that the region must seize upon (Mr. Marco Dubé, DM50, p. 5). "With an unemployment rate of 8.3% (April 2006), the Lower St. Lawrence region can't let such an important industrial project pass it by (Association internationale des débardeurs, local 2033, DM52, p. 5). According to the Chambre de commerce de la MRC de Rivière-du-Loup, this project would give a second wind to this resource-based region, which is facing an exodus of

its young people, feeling the effects of the softwood lumber crisis, and, like elsewhere in Quebec, adapting to the changes resulting from the globalization of markets (DM35, p. 7).

A labour union estimated that the 35 jobs created during the operation of the LNG import terminal would be specialized and well-paid (Conseil central du Bas-Saint-Laurent, DM41, p. 1). The Centre local de développement de la région de Rivière-du-Loup thought that these jobs could be filled, for the most part, by people from the region of Rivière-du-Loup, but also from neighbouring MRCs such as Les Basques, Kamouraska or even Témiscouata (DM21, p. 6). More than 800 workers would be hired for construction, and these new jobs would allow "existing and future businesses to prosper. By the same token, many job opportunities will emerge at many levels. People will be trained. Others will gain from valuable experience and many graduates from the vocational or academic field would be able to work and spend their money (Ms. Mona et Mr. Célestin Simard, DM71, p. 3).

According to some participants, increasing the number of jobs in the region represents a major advantage for those hoping to find work in their community (Les propriétaires à la pointe sud ouest et résidants saisonniers ou permanents, DM13, p. 2; MRC de Rivière-du-Loup, DM45, p. 7).

Malécite de Viger First Nation

The Malécite de Viger First Nation testified during the hearings on the impacts that the LNG terminal would have on its development, as well as on its community projects. According to a representative of the band council, the LNG terminal would conflict with the community's rebuilding efforts, and with an ecotourism project that is planned on the Pointe Saint-Georges and the Gros Cacouna peninsula. This project is seen as a way to ensure viable economic development for the Malécites Nation, in order to reduce its economic dependence on governments. The Malécites Nation is worried about the LNG terminal's impact on its hunting and fishing agreements, and wanted to obtain financial support to undertake studies on the project's impacts (Ms. Martine Bruneau, DM48, p. 5 et 6).

Concerns were raised with respect to the cave decorated with paintings which was recently discovered on the Gros Cacouna peninsula: "The expansion of the port facilities will require blasting. The cave's location makes it an obvious target. It will be destroyed by this work" (Mr. Jean Genest, DM85, p. 2).

Impacts on the natural environment

Many participants were worried about the project's impacts on the natural environment. Some thought that the project's biophysical impacts should be analyzed from the standpoint of cumulative effects (Conseil régional de l'environnement du Bas-Saint-Laurent, DM47, p. 30; Messrs. Denis Cusson and Gérald Dionne jr, DM40, p. 5; Mr. Yvan Roy, DM75, p. 7 and 8).

The coastal environment

Changes to the ice conditions around the terminal installations were a concern for some participants:

> The repeated breaking up of the frozen surface around the facilities would inevitably result in making the shore ice brittle, fractured and dispersed […] The disappearance of the shoreline's protective surface will necessarily bring about the accelerated and irreversible erosion of the banks.
> (Ms. Sylvie Pomerleau and Mr. Germain St-Onge, DM78, p. 2 and 3)

Another issue was the impact of releasing warm water from the LNG terminal on the receiving environment:

> In spite of the St. Lawrence River's great dilution capacity, it is wrong to say that the continuous release of 260,000 litres of warm fresh water per day will not have an impact on the marine wildlife and plants close to the LNG terminal.
> (Ms. Catherine Pelletier, DM89, p. 3)

Marine mammals and fish

Some participants were worried about the negative impacts that the project could have on fish populations and on marine mammals, including belugas (Mr. Peter W. Jones, DM90, p. 3; Comité ZIP du sud de l'estuaire, DM25, p. 5 to 7; Groupe de recherche et d'éducation sur les mammifères marins, DM73, p. 5 and 6). In this respect, the Groupe de recherche et d'éducation sur les mammifères marins stated:

> […] it seems unthinkable to us to authorize the pile driving planned by the proponent from the month of June through October. The area targeted is habitat that is regularly visited by pregnant females [belugas] and mothers accompanied by newborns belonging to an endangered population!
> (DM73, p. 6)

The Comité de recherche et d'intervention environnementale du Grand-Portage made essentially the same observation with respect to the protection of the beluga.

> The beluga has a great symbolic value for the people of Quebec. […] the decisions which will be made by our federal and provincial governments with respect to the LNG terminal will certainly allow us to gauge the importance that they give to the protection of endangered species in this country. If the authorities don't protect the beluga whale, what species will they protect?
> (DM49, p. 37)

The Comité ZIP du sud de l'estuaire, for its part, requested that the follow-up and monitoring of marine mammals, particularly the beluga whale and the harbour seal, be independently ensured by qualified external experts (DM25, p. 7).

The avifauna

One participant mentioned that "as presented, the LNG terminal project threatens the integrity of the protected ecosystems at the heart of which it is proposed to be built" (Mr. Yvan Roy, DM75, p. 8). The marsh and cliff to the north of the Gros Cacouna peninsula are important nesting sites for a great number of bird species (Ms. Élise Marquis, DM20, p. 3). According to the Club des ornithologues du Bas-Saint-Laurent, the Gros Cacouna peninsula is the only known site in this region with a high concentration of Black-crowned Night Herons. These birds use a wooded area located right at the entry of the site. "It is obvious that the construction period would greatly disturb the herons that visit this area" (DM61, p. 4).

According to this organization, the cliff located nearby is a nesting site for the Peregrine Falcon, a vulnerable and threatened species. Two young falcons were sighted there in 2004 (*ibid.*, p. 1, 2 and 13). One participant underscored the importance of the cliff for this species:

> Just because there are other useable zones, that does not justify destroying the area currently being used by the Peregrine Falcon. This species specifically uses the cliff at Gros-Cacouna because this site meets its needs for hunting, reproduction and movement.
> (Mr. Réjean Dion, DM42, p. 8)

The marsh is recognized as one of the best nesting sites for the Yellow Rail, a species at risk, and "furthermore, it is one of the very rare places in Quebec where one can regularly observe three bird species that are classified as vulnerable: the Yellow Rail, the Peregrine Falcon and the Bald Eagle" (Comité de recherche et d'intervention environnementale du Grand-Portage inc., DM49, p. 26).

The Club des ornithologues du Bas-Saint-Laurent was worried about the possible construction of an LNG import terminal close to the Cacouna marsh, as it is "classified

as an important bird conservation area in North America, and is of world-class importance" (DM61, p. 1). In addition:

> The site is a major stopover point in the spring for ducks and many other species, particularly because of the variety of its wetlands. These habitats, and the cliff located north of the quarry, are also important nesting sites for a great many birds.
> (*Ibid*.)

The Comité de recherche et d'intervention environnementale du Grand-Portage inc. noted the fact that the marsh is one of the ten best breeding sites in Quebec for American Black Duck. The cliff also serves as a nesting site for a colony of Black Guillemot (DM49, p. 26).

Lastly, the Amis de la vallée du Saint-Laurent recommended that work at the LNG terminal that could disturb the wildlife through noise or other disturbances only be done during the periods that are the least harmful for these populations (DM65.1, p. 13).

Greenhouse gases

Some saw the advent of an LNG terminal in Quebec as an opportunity to reduce the provincial production of greenhouse gases (GHG). However, the Regroupement national des conseils régionaux de l'environnement du Québec, for its part, believed that "importing natural gas through the establishment of an LNG terminal, will increase the share of greenhouse gases attributed to Quebec, even if the gas is exported and used outside of Quebec" (DM64.1, p. 10). Greenpeace Quebec noted that the release of CO_2 into the atmosphere through burning natural gas, combined with the energy penalty inherent to LNG, would result in an increase in GHG emissions compared to the emissions currently generated by natural gas obtained through domestic sources. According to this group, all new production of electricity by natural gas would represent a setback with respect to Quebec's GHG emissions compared to 1990, unless the natural gas were to replace a more polluting form of energy such as petroleum or fuel oil (DM80.1, p. 6, 7 and 11). This idea of replacement was also taken up by the City of Rivière-du-Loup, which believed that this approach could allow Quebec to transition, over a 40 to 50 year period, towards technologies and energy forms that are "greener" (DM60, p. 3).

The Association québécoise de lutte contre la pollution atmosphérique believed that the increase in demand for natural gas would not be compatible with measures aimed at reducing our dependency on fossil energy. Possible legislation aimed at limiting GHG emissions could hurt the LNG terminal's profitability (DM68, p. 39).

Mitigation measures

Some participants were worried about the condition of the site once the work is completed. For example, Les Amis de la vallée du Saint-Laurent wanted the site to be both functional and aesthetically pleasing. They proposed, among other suggestions, to construct a lookout (DM65.1, p. 9 and 10). Another organization believed that planting trees, such as willows, would foster a more harmonious integration of the project with the landscape (Étape Normandie Rivière-du-Loup, DM44, p. 11).

The Office du tourisme et des congrès de Rivière-du-Loup proposed the creation of a tourist attraction about natural gas, which would explain the port and would meet the need for tourism services. This initiative would help harmonize the operation of the LNG terminal with the site's opportunities to welcome tourists (DM46, p. 4). The Office also believed that the project should take into account the access and safety of users of various tourism services offered nearby. "This process must be preserved during the construction, development and operation of the site" (*ibid*., p. 3).

The Fédération québécoise du canot et du kayak and the Route bleue du sud de l'estuaire were of the opinion that concrete measures should be put into place to reduce the risk of accidents around docked LNG tankers. A shuttle service and a communications system to inform kayakers of the existence of the security perimeter should also be set up. Moreover, "in order to compensate for the reduction in the appeal factor of the Route bleue du sud de l'estuaire, we want the proponent to pay the insurance premiums of private sites and take part in the marketing and innovative development of rustic campgrounds sites" (DM11, p. 14).

The Agence de la santé et des services sociaux du Bas-Saint-Laurent requested that the noise level be recorded on a continuous basis from the construction period until two years after the start of operations. "During the operations phase, there must be means to restrict port activities during the evening and nighttime to better control the impacts at these two crucial times of the day" (DM22, p. 1). The Centre de santé et de services sociaux de Rivière-du-Loup added the following:

> Furthermore, the issue of sleep and associated sleep-disturbance problems requires that there be measures to reduce the noise level at the source, and additional measures prohibiting operations during the evening and night during the construction and operation phases, in order to minimize the negative impacts of this additional source of artificial noise.
> (DM62, p. 4)

Noise during the construction phase worried some participants, who proposed measures to control, correct or reduce anticipated effects. For example, the

Fédération québécoise du canot et du kayak and the Route bleue du sud de l'estuaire proposed the following:

> We recommend that blasting be done outside of the busiest tourist season, i.e. before Saint-Jean-Baptiste Day and after Labour Day, in order to reduce the impact of noise on tourists and users of the Route bleue du sud de l'estuaire. (DM11, p. 13)

Various organizations requested that there be a follow-up program addressing air quality during construction and operation of the terminal using sampling stations (Centre de santé et de services sociaux de Rivière-du-Loup, DM62, p. 4; Conseil central du Bas-Saint-Laurent, DM41, p. 16; Agence de la santé et des services sociaux du Bas-Saint-Laurent, DM22, p. 2).

Lastly, the Conférence régionale des élus du Bas-Saint-Laurent suggested the establishment of a proponent/environment harmonization table, whose mandate would be to propose, all throughout the construction phase, corrective measures to lessen the impacts that are bound to arise along the way (DM57, p. 5).

Chapter 2 LNG terminal project and choice of site

According to the proponent, the purpose of the project is to import natural gas by ship in order to satisfy the long-term energy needs of central Canada (Quebec and Ontario) and the north-eastern United States (PR3.1, p. 1-21).

Until now, Canada has met its natural gas needs with its own resources. It currently has no facilities for importing LNG and it is a net natural gas exporter to the United States[1]. It was therefore necessary to examine the merits of the proponent's objective, which involves the introduction of a new source of supply. This examination prompted the Panel to analyse in turn the natural gas market targeted by the project, the feasible alternatives presented by the proponent, the choice of the site and the future pipeline, the LNG supply, the possible need for a third storage tank, and the GHG emissions linked to the project.

Status of the North American natural gas market

The deregulation of oil and natural gas markets in Canada and the United States in 1985 put an end to the government intervention that followed the oil crises of 1973 and 1979[2]. Moreover, the Free Trade Agreement between Canada and the United States in 1989, and its extension in 1994 to include Mexico in the North American Free Trade Agreement, created an integrated North American natural gas market in which most regions are linked by an extensive network of gas pipelines. The Quebec market is a component of this market and this must be taken into account in the analysis. The small net exports of natural gas from the United States to Mexico will not be discussed further here.

Market evolution from 1991 to 2003

Table 1 summarizes the evolution of natural gas consumption in the United States, Canada, Ontario, and Quebec from 1991 to 2003. From 1991 to 2000, consumption increased in the four regions, with annual growth rates ranging from 1.8% in Quebec

1. According to the U.S. Department of Energy, Canadian exports represented 18.1% of U.S. consumption in 2005. [On line (July 10, 2006): www.eia.doe.gov]
2. *Western Accord, an agreement among the governments of Canada, Alberta, Saskatchewan and British Columbia on oil and natural gas prices and fiscal matters*, March 28, 1985.

to 3.6% in Canada. However, except for Ontario, natural gas consumption dropped from 2000 to 2003 in comparison with other energy forms in the overall consumption of primary energy[1].

Table 1 Natural gas demand in billions of cubic metres from 1991 to 2003 and natural gas share in primary energy consumption (in percentage)

	United States	Canada	Ontario	Quebec
1991	554.2 (23.2)	71.5 (31.3)	22.3 (30.9)	5.5 (14.5)
2000	661.0 (24.7)	94.8 (33.3)	28.9 (34.4)	6.4 (13.2)
2003	631.0 (23.0)	93.6 (31.4)	29.1 (34.4)	5.8 (11.4)
Annual growth rate, in percentage				
1991-2000	2.0	3.6	3.2	1.8
2000-2003	-1.5	-0.4	0.2	-3.1

Sources: Statistics Canada, Quarterly Report – *Energy Supply and Demand in Canada*, No. 57-003-XPB. Annual Energy Review. [On line (May 26, 2006): www.eia.doe.gov]

Furthermore, market deregulation led to faster annual growth in natural gas production in Canada than in the United States from 1991 to 2000, as illustrated in Table 2. However, production has dropped in both countries since 2000.

Table 2 Production of natural gas in billions of cubic metres from 1991 to 2003

	Canada	United States
1991	118.6	501.3
2000	185.9	543.4
2003	183.9	541.0
Annual growth rate, in percentage		
1991-2000	5.0	0.9
2000-2003	-0.4	-0.1

Sources: Statistics Canada, Quarterly Report — *Energy Supply and Demand in Canada*, No. 57-003-XPB. Annual Energy Review. [On line (May 26, 2006): www.eia.doe.gov]

1. Primary energy refers to energy coming directly from nature such as oil, natural gas, coal, uranium, hydroelectric energy, and biomass. Secondary energy refers to energy transformed for consumer use: fuel oil, gasoline, natural gas, coal, hydroelectricity, thermal power (coal, oil, natural gas, biomass) and nuclear power.

An indicator of natural gas demand pressure compared to production capacity is the increase in the price of imports to the United States from Canada. Whereas in the 1990s the price was less than US$2 per million BTUs, it increased to US$3.90 in 2000 and to US$7.95 in 2005[1, 2].

This price increase revived interest in LNG imports by the four LNG terminals built in the United States in the early 1980s. Gross LNG imports increased from 1.8 billion cubic metres in 1991 to 6.4 billion cubic metres in 2000 and to 17.9 billion cubic metres in 2005. These gross LNG imports in 2005 represented at that time 3 per cent of natural gas consumption in the United States[2].

With only four LNG terminals, LNG import capacity in the United States at present seems to be too small to integrate the North American natural gas market into the world market, as illustrated by the price spreads (in US dollars per million BTUs) in 2004: Japan: $5.18, European Union: $4.56, and Texas (Henry Hub): $5.85 (*BP Statistical Review of World Energy*, June 2005, p. 29). These price differences create opportunities for LNG terminal owners who wish to purchase natural gas in regions where prices are low and to sell it in regions where prices are high.

- *Finding – The Panel found that, although natural gas consumption increased in North America in the 1990s, its share of total energy consumption is stagnating and even diminishing since year 2000. This slowdown appears to be caused by price increases resulting from the fact that North American production has reached a peak.*

- *Finding – The Panel found that the high natural gas prices in North America have revived interest in importing LNG.*

Natural gas demand and supply forecasts for the next two decades

Demand

As mentioned above, the increase in the natural gas price has slowed growth in demand. Given current constraints on supply, the United States Department of Energy anticipates that prices will stay high, namely US$6 per million BTUs, even though prices dropped below US$5 per million BTUs for a few days at the end of September 2006. A moderate demand increase is forecast over the long term, i.e.,

1. 1 000 cu. ft. = 1.0203 million BTUs.
2. [On line (July 11, 2006): www.eia.doe.gov]

0.7% per year to 2030. Therefore, the share of natural gas in the overall primary energy demand picture will decrease from 23% to 21% in 2030[1].

The National Energy Board regularly analyses the long-term evolution of the Canadian energy market. Its latest analysis in 2003 provides two scenarios for exploring the possible evolution of the Canadian energy market. The first scenario, called *Supply Push,* corresponds to the trends observed in recent decades: the trend toward growth in energy consumption is more and more limited by availability of resources. The second scenario, called *Techno-Vert*, incorporates a growing concern for the environment, in particular greenhouse gases, and this concern is accompanied by support for technological change favouring energy efficiency and clean and renewable energies. For Canada, the National Energy Board expects growth in demand for natural gas of 1.6% per year to 2025, with a total primary energy demand share of 27.9% under the *Supply Push* scenario or 31.1% under the *Techno-Vert* scenario. For Quebec, the National Energy Board expects growth in demand for natural gas of 2.3% per year to 2025, with a total primary energy demand share of 16.8% under the *Supply Push* scenario or 19.4% under the *Techno-Vert* scenario (National Energy Board, 2003).

The ministère des Ressources naturelles et de la Faune (MRNF) (Ministry of Natural Resources and Wildlife) anticipates a rather slow growth in natural gas demand of 0.8% per year to 2026. This growth would result from sustained growth in the manufacturing sector and from the commissioning of the Bécancour cogeneration facility at the end of 2006. The latter should use 100 million cfgpd (2.83 million cubic metres per day), or more than 15% of Quebec's total consumption. The Ministry does not foresee the commissioning of any other natural gas-fired generating facilities (DB5, p. 7).

The Government of Ontario intends to eliminate coal-fired electricity generation. Table 3 presents the evolution of generating capacity to 2025, as shown in a plan published in June 2006. This plan includes an expanded role for gas-fired electricity generation of approximately 5,000 MW. Three facilities are already under construction, namely Portlands (Toronto), 550 MW, Sithe (Brandon), 850 MW, and Greenfield Energy Central (Courtright), 1 005 MW.

The proponent predicts that natural gas demand in Quebec and Ontario will increase from 3.4 to 4.4 billion cfgpd on average from 2005 to 2015, for an annual increase of 2.5% (MR. Carl Lussier, DT1, p. 58). The Panel has deduced that this growth forecast, which appears higher than those of the National Energy Board and the

1. *Annual Energy Outlook with Projections to 2030*. [On line (July 12, 2006): www.eia.doe.gov]

Ministry of Natural Resources and Wildlife, can be explained by the shorter horizon used by the proponent.

Table 3 Composition of generating capacity in Ontario (MW)

Source	2005	2025
Coal	6 434	0
Natural gas and cogeneration	4 976	9 650
Renewable	7 855	15 700
Nuclear	14 000	14 000
Conservation	675	6 300
Total	**33 940**	**45 650**

Source: [On line (June 23, 2006): www.energy.gov.on.ca]

- ***Opinion 1 –*** *The Panel is of the opinion that the proponent's forecast is consistent with forecasts made by North American public agencies who anticipate moderate growth in the long-term demand for natural gas in North America.*

Supply

The three main geological regions producing natural gas in Canada and the United States are the Western Canada sedimentary basin, the Gulf of Mexico, and several basins to the southeast of the American Rockies. They are known as mature development regions because they have been explored and have produced gas for many years. Production is already declining (see Table 2).

In its annual forecast, the United States Department of Energy anticipates that the decline in production will continue in the United States, even if the Alaska pipeline is commissioned at the end of the next decade. Only a substantial contribution from unconventional sources, such as coal bed methane, would enable natural gas production to increase. The Department also anticipates a drop in imports from Canada, and has predicted that the growing gap between demand and available production in North America would be filled by net LNG imports, that would have to increase from 17 billion cubic metres in 2004 to 125 billion cubic metres in 2030 in the United States[1].

Four LNG import terminals are in operation in the United States. In addition, seventeen have been approved, of which only one is north of New Jersey, namely at Fall River, Massachusetts, and twenty-two are proposed. Three have been approved

1. *Annual Energy Outlook with Projections to 2030*. [On line (July 12, 2006): www.eia.doe.gov]

in northern Mexico and three in Canada (Canaport, Saint John, N.B.; Bear Head LNG, Point Tupper, N.S.; and Kitimat, B.C.). Currently, five sites are proposed in Canada, including three in Quebec, one in Nova Scotia, and one in British Columbia[1]. Approval of an LNG terminal does not guarantee that it will be built.

Extraction of methane from coal deposits and the possible arrival of natural gas from the Mackenzie Delta would barely maintain Canadian production, according to scenarios established by the National Energy Board in 2003. According to the NEB, the pressure of demand in relation to production capacity will lead to LNG imports to Quebec early in the coming decade.

This vision of future natural gas supply in North America is shared by Natural Resources Canada:

> Forecast declines in conventional natural gas production are largely offset by expected increases in production from unconventional sources in Western Canada, natural gas production in the Mackenzie Delta and Alaska, and the importation of LNG into North America, including into Canada. In 2020, North American LNG imports should be about 182 billion cubic metres. In 2020, LNG imports are expected to account for approximately 20% of total North American natural gas supply. Today, LNG imports represent only 2% of total North American supply
> (Natural Resources Canada, 2005c, p. 8).

Based on these forecasts, importing these quantities of LNG to North America could lead to development, by 2020, of 35 LNG terminals with a capacity equivalent to that foreseen for the Cacouna Energy LNG terminal, namely 500 million cfgpd (14.2 millions cubic metres per day). However, since most of the LNG terminals operating or approved have greater capacity, varying from 500 million to 3 300 million cfgpd (94 million cubic metres per day), fewer LNG terminals would be necessary to meet these forecasts.

- *Finding – The Panel found that, based on the opinion of the concerned government agencies, unconventional sources of natural gas supply, including liquefied natural gas, will likely be required to satisfy projected North American demand until 2030.*

Canadian and Quebec government policies on LNG imports

Since 1985, the Canadian government has maintained a free-market policy as regards energy supply and has not intervened to influence supply or demand. It has already approved two LNG terminal projects in New Brunswick and Nova Scotia.

1. [On line (July 27, 2006): www.ferc.gov]

In April 2006, the Government of Quebec published its new energy policy, *Using Energy to Build the Quebec of Tomorrow, Quebec Energy Strategy 2006-2015*, in which it explicitly takes a position in favour of LNG imports to Quebec (DB4, p. 82).

- *Finding – The Panel found that the Canadian and Quebec governments have adopted positions that support development of LNG terminals for importing LNG.*

Effects of the construction of Cacouna Energy LNG terminal on natural gas prices

A fundamental economic principal is that increased supply for a given level of demand generally causes prices to drop. To analyse the significance of this effect in the case of the project, the integration of the North American natural gas market, with the assumption that there is a single price once transport costs are considered, must be taken into account. In 2004, the average yearly prices expressed in US dollars per million BTUs were $5.89 at Henry Hub in Texas, $5.07 at AECO in Alberta, $6.11 at Dawn (hub to the west of Lake Erie, Ontario), and $6.67 at Iroquois, a natural gas entry point for Eastern Ontario and Quebec located at Cornwall, Ontario (Energy and Environmental Analysis Inc., 2005, p. 26).

The LNG brought in through the Cacouna Energy LNG terminal would thus be in competition with other sources of supply in North America, including the LNG from other North American terminals. The basis for price comparison in the Quebec market would likely be the price at Iroquois in Ontario. The price at Cacouna should therefore be the same as at Iroquois following trading by purchasers in the Eastern Ontario and Quebec market.

The proponent did not provide studies addressing the drop in natural gas price resulting from development of the Cacouna project. However, the Panel used a study conducted for the Rabaska project at Lévis, which has the same capacity as Cacouna (*ibid*.). According to this study, addition of this amount of LNG would cause the price in Quebec and Ontario to decrease by $0.46 per million BTUs (in 2004 dollars) between 2010 and 2025, as compared to an average price of $8.44, for a drop of 5.4%. If the LNG were to come from the Gulf of Mexico instead of Quebec, the price drop would be less at $0.20 per million BTUs, or 2.3%, given Quebec and Ontario's geographical position in relation to an LNG terminal located on the Gulf of Mexico.

Construction of LNG terminals in North America should continue as long as the gap between the price of natural gas in this region and the prices of worldwide supply sources available continues. In addition, price uniformity at the different LNG entry points in North America should be established, since proponents will, to the extent

possible, choose to have their projects in regions where the prices are the highest. The natural gas market would thus be integrated internationally, as is the case with oil.

In Quebec, the National Energy Board's tariff system for transmission and the regulation of rates by the Régie de l'énergie's distribution system mean that consumers in the Bas-Saint-Laurent region would not benefit from any particular price advantage. The main advantage would stem from accessibility to a new form of energy. However, this accessibility would depend on the will of Gaz Métro, which holds the distribution franchise for this region (Mr. Jean D'Amour, DT9, p. 36).

The proponent and the Government of Quebec present diversification of supply sources as a mean to make natural gas delivery in Quebec more secure (PR3.1, p. 1-21 to 1-28; DB4). The Panel understands that the integration of the North American market means this argument has little weight since the increased security of supply would only make itself felt should a major transportation system breakdown occur west of Quebec. Such events are rare. Indeed, it is difficult to predict the impact on price volatility of increased North American dependence on LNG. Increased supply should reduce price volatility, but the global LNG market has its own volatility. The same phenomenon exists for oil. The presence of oil refineries in Quebec does not shelter it from fluctuations in the world oil price. The same would apply for LNG prices.

- ***Opinion 2 –*** *The Panel is of the opinion that increased supply of natural gas through liquefied natural gas in Quebec would likely cause a mild reduction in natural gas prices both in Quebec and throughout North America since the markets are integrated.*

- ***Opinion*** *3 – The Panel is of the opinion that the LNG terminal project would improve the security of natural gas supply in Quebec only in the rare case of a breakdown in the Western transportation system.*

- ***Opinion 4 –*** *The Panel is of the opinion that the Cacouna LNG terminal project is justified as a means to improve natural gas supply in North America.*

Feasible alternatives

According to the Canadian Environmental Assessment Agency, the "alternatives" are "functionally different ways to meet the project need and achieve the project purpose"[1]. In this case, a new source of natural gas supply is being provided so as to

1. Operational Policy Statement OPS-EPO/2-1998.
[On line (August 24, 2006): www.ceaa-acee.gc.ca/013/0002/addressing_e.htm]

meet future needs in North America. In its analysis, the proponent must consider the environmental effects of alternatives to the project.

After concluding that natural gas had a role to play in Quebec's energy future, along with energy efficiency and renewable energies, and after establishing that the North American system would need more natural gas, the proponent considered three options other than LNG imports, namely:

– Expansion of the TransQuebec and Maritimes Inc. system that transports natural gas from Western Canada to Quebec;

– Reversal of natural gas flow in the Northland Natural Gas Transmission System so as to supply Quebec from the United States;

– Construction of a gas pipeline linking Quebec to the Maritime & Northeast Pipeline in New Brunswick (PR3.1, p. 1-29).

These three alternatives concern gas pipeline projects and rely on natural gas supply coming mainly from North American production zones that have already begun to decline, and not from new sources for the north-eastern North American market, such as exploration in the Atlantic or in the Gulf of St. Lawrence. After a summary analysis, the proponent concluded that none of the alternatives was viable.

- ***Opinion 5 –*** *The Panel is of the opinion that the proponent has not considered meaningful alternatives for developing a new source of natural gas supply in North America.*

- ***Recommendation 1 –*** *The Panel recommends that the proponent demonstrate that this project represents the only technically and economically realizable alternative for increasing natural gas supply in North America.*

Site selection and connection of LNG terminal to North American network

Site selection

The proponent's site selection criteria for the LNG terminal were: location on the south shore of the St. Lawrence to facilitate connection to the existing gas pipeline system, a large enough area to accommodate a terminal with an average annual capacity of 500 millions cubic feet (Mcf) per day, and acceptability from both social and environmental standpoints. In this regard, the proponent took into account the

compatibility of the project with land use. Marine conditions were also considered, including water depth, navigable waterways, ice, waves, and currents. Based on these criteria, the proponent identified a dozen potential sites between Quebec City and Matane.

A second analysis was done taking into account more specific requirements. For example, the terminal should be located at a distance of 1 km from developed areas, with a minimum water depth of 15 m at less than 1 km from shore, and the land facilities should be at a distance of less than 10 km inland. The terminal should also have a minimum area of 25 ha available for the land facilities, it should avoid major active seismic zones as well as parks, bird sanctuaries, and other special use areas such as lands belonging to First Nations (PR3.1, p. 2-3 à 2-21).

Following work in the field, the proponent retained three potential sites: Gros-Cacouna, Petit-Métis and l'île Verte. Finally, the proponent chose the Port of Gros-Cacouna because of the existing industrial and port zoning, but also because the currents and tides are not as great and the LNG tanker route would be facilitated because the southern channel in the estuary is not as busy as the northern channel (Mr. John Van Der Put, DT4, p. 35 et 54).

Nevertheless, participants in the public hearings contested the choice of the site because of the proximity of the population of Cacouna, the many protected wildlife habitats, as well as the seismic zone in the Charlevoix region. As for the Panel, it questioned the choice of Petit-Métis and l'île Verte as potential sites because, even though they offer certain advantages from the navigation standpoint, they are not industrial sites. There would thus be an incompatibility with the current use of the land, and this condition seemed to be important to the proponent. What is more, the safety of the population would have been difficult to ensure given the proximity of residences and cottages. For the Panel, these two constraints should have resulted in the rejection of both sites by the proponent at the very beginning of his analysis.

- ***Opinion 6 –*** *The Panel is of the opinion that, of the three sites studied in detail by the proponent for project construction, two were not compatible with the industrial vocation of an LNG terminal. The fact of considering the possibility of building an LNG terminal at Petit-Métis or at l'île Verte is poorly grounded.*

Connection of LNG terminal to North American natural gas transportation network

The proponent foresees a natural gas pipeline 240 km long that would transport the natural gas transiting through the Cacouna terminal to the North American market. This pipeline would be connected to the head of the TransQuebec and Maritime Inc.

pipeline located at Lévis. In public hearings, the proponent indicated that the eventual pipeline project proponent would ensure that the existing Quebec transportation network would have the capacity to take the natural gas to the markets. However, no route and no environmental assessment exist yet, even though commissioning of the pipeline must coincide with that of the LNG terminal to allow the delivery of natural gas (PR3.1, p. 1-31; PR5.0, QC-006; Mr. John Van Der Put, DT3, p. 61 à 67).

From the LNG terminal, the gas pipeline would first have to cross the Transport Canada harbour property and then head towards Lévis. As with the LNG terminal, the Department would have the gas pipeline owner sign a lease. No study of routes on the Transport Canada property has been conducted to date, and the proponent reiterated that such a study is only expected in the context of the overall pipeline project, despite the Panel's requests for proposed routes on this property and for an assessment of environmental impacts. During the public hearings, however, the proponent did identify a route running along the Gros-Cacouna port access road and another along the dyke separating the western basin from the marsh (PR8.7, Q-255; DQ1.5, BAPE21.3; Mr. John Van Der Put, DT5, p. 87 and 88).

Some participants, including the Fédération de l'UPA du Bas-Saint-Laurent, were concerned about the potential impacts of the gas pipeline. They fear expropriations, clearing of forests, loss of agricultural lands, increased technological risks, as well as the possibility of facing a *fait accompli* since an LNG terminal absolutely needs a pipeline.

This decision by the proponent to split the project into two components to be assessed and reviewed separately is not a precedent. Previous BAPE commissions have, in fact, stated in their reports that an essential ancillary facility, such as the gas pipeline, be reviewed at the same time as the main component of the project, in this case the LNG terminal.

- ***Opinion 7 –*** *In the case of a positive decision on the project, the Panel considers that the government approvals on start-up of work on the LNG terminal should be contingent upon to a public environmental review that comes out in favour of the gas pipeline project.*

LNG supply

The two project partners, TransCanada Pipelines Limited and Petro-Canada, have different roles in this project. The former would be responsible for operating the LNG terminal facilities whereas the latter would be responsible for the purchasing, marine shipping, and selling of the natural gas. Only thirteen countries currently have

liquefaction plants, with a total capacity of 580 million cubic metres per day. Four countries have more than 50% of this capacity: Indonesia, Malaysia, Algeria, and Qatar. In 2004, Japan was responsible for more than 43% of purchases (Mr. Carl Lussier, DT1, p. 56; PR8.7, Q-005; *BP Statistical Review of World Energy*, 2005, p. 28). The market is thus concentrated on both the producer side and the purchaser side, and there is no market for open trading of LNG, like the London Metals Exchange for aluminum or Rotterdam for oil. The absence of an open market is due to the low demand and the high cost of liquefaction and regasification plants. That is why each LNG terminal proponent, who cannot now count on an open market for supply, must conclude a long-term agreement in order to increase liquefaction capacity.

On October 12, 2004, Petro-Canada signed an agreement-in-principle with Gazprom, the state-owned corporation responsible for natural gas development in Russia, to study the possibility of jointly building a liquefaction plant that could cost between 1 and 6 billion US dollars (PR3.1, p. 1-18). This agreement was followed by another, signed on March 14, 2006, to conduct an engineering and cost estimation study for an LNG liquefaction plant located at Saint Petersburg. It is mentioned that this plant would supply the Cacouna Energy LNG terminal[1]. This subject was discussed during a meeting between the Prime Minister of Canada, Mr. Stephen Harper, and the President of the Russian Federation, Mr. Vladimir Putin, at Saint Petersburg, on July 15, 2006[2]. Russia currently has one third of world natural gas reserves and has no liquefaction plants.

- *Finding – The Panel found that the proponent has not yet signed an agreement providing for liquefied natural gas supply for the LNG terminal project, but that the proponent is negotiating an agreement in this regard.*

Possible need for a third storage tank

The proponent proposes construction of two LNG storage tanks. The LNG terminal development plan was designed to allow for the addition of a third storage tank at a later date (Figure 3). This development would require more extensive blasting on the northwest section of the Gros Cacouna peninsula, to prepare the ground for its possible construction (PR3.1, p. 2-24; PR5.1, QC-016, p. 3 and Figure 6, and QC-018).

Construction of a third storage tank is not planned for the moment and will depend on a business decision (PR5.1, QC-018). The proponent suggested two factors that

1. [On line (June 23, 2006): www.online.petro-canada.ca]
2. *Joint Statement by the Prime Minister of Canada, Mr. Stephen Harper, and the President of the Russian Federation, Mr. Vladimir Putin, on Canada-Russia energy cooperation*, July 15, 2006, Saint Petersburg.

could result in the addition of a third storage tank: growth in natural gas demand in Quebec and Ontario and use of the site by other companies wishing to use LNG. According to the proponent, "It is [...] wise from a business standpoint to anticipate the possibility of growing markets" (Mr. John Van Der Put, DT7, p. 127).

Should blasting be reduced and limited to the area required for two storage tanks, the later addition of a third storage tank would nonetheless remain possible. In such circumstances, the proponent would have two options, either blasting part of the Gros Cacouna peninsula or building the third storage tank south of the first two. The first option would present a risk to the existing storage tanks, while the second option would require an increased area for the site and the use of lands not zoned for industrial purposes (PR5.1, QC-018).

The capacity of the LNG terminal was calculated to receive LNG tankers with a capacity of 165 000 cubic metres every six days on average. At a flow rate of 981 m^3/h of LNG, which corresponds to a flow rate of natural gas in the pipeline of 589 930 m^3/h, it would take nearly a week to empty a storage tank. The tanks therefore have a reserve of almost two weeks. In an LNG tanker could not deliver LNG according to schedule, the capacity of the two storage tanks would allow for supply to the natural gas transmission grid for about six more days with no service interruptions, until the arrival of the next LNG tanker (DQ1.2, p. 1; Mr. John Van Der Put, DT3, p. 43 and 44).

As regards the proposed equipment, a third storage tank would not have any impact on such facilities as vaporizers, pumps, or even the future gas pipeline. Therefore, it would provide a reserve of almost three weeks with the same pipeline capacity. This storage tank would not necessarily increase marine traffic, since larger LNG tankers could be used for LNG supply (DQ1.2, p. 3; Mr. John Van Der Put, DT4, p. 49; PR5.1, QC-018). On this point, the proponent did not wish to provide the Panel with further details, since that would be under the purview of a separate environmental assessment.

- ***Opinion 8 –*** *The Panel is of the opinion that it is called upon to review an LNG terminal project with a two storage tank development plan based on the proponent's decision not to include the third storage tank for consideration in the current public review.*

Natural gas and greenhouse gas emissions

In 2004, annual GHG emissions in Canada were 758,000 kt of CO_2eq. The energy sector (e.g., electricity and oil industries, transportation, gas pipeline transportation, etc.) represented 81.8% of total GHG emissions in Canada. In comparison, GHG

emissions in Quebec in 2003, all sectors included, were 91,500 kt of CO_2eq, or approximately 12.5% of Canada's total emissions (Environment Canada, 2004 and 2005).

The net increase in GHG emissions for the energy sector in Canada between 1990 and 2004 was 30.3%, or 145,000 kt of CO_2eq, of which 36.6% can be attributed to the generation of electricity and heating and 49% to production of fossil fuels. The increase in Canadian emissions can be explained particularly by an increased use of coal to generate electricity over this period. The oil industry contributed significantly to GHG emissions, registering a 58.9% increase during the same period, mainly because of the growth in crude oil and natural gas exports to the United States. Another major source of GHG linked to the export of oil and natural gas to the United States is the contribution of fugitive emissions, responsible for nearly 66,500 kt, an increase of 23,100 kt compared to 1990 (53.4%).

The National Energy Board's *Supply Push* scenario would favour coal-fired generating plants and even increased use of coal. On the other hand, with the *Techno-Vert* scenario, technologies less polluting in terms of GHG would emerge, such as clean coal, wind energy, and advanced nuclear reactors. Also under the *Techno-Vert* scenario, about 10% of the energy used would be renewable, such as biomass and small hydroelectric plants, as compared to only 3% for the *Supply Push* scenario (National Energy Board, 2006).

In Canada, the quantity of GHG would continue to increase as the economy and energy demand grow, despite the use of so-called "green" technologies. Coal would be used to meet 12% of total demand in 2025 in the *Supply Push* scenario, as compared to 8% for the *Techno-Vert* scenario. Quebec's Energy Strategy calls for various energy consumption reduction targets aimed at avoiding about 9.4 million tons of CO_2eq in 2015 (Ministry of Natural Resources and Wildlife, 2006, p. 44).

For all of Canada in 2002, the energy balance in terms of total energy available for consumption was broken down as follows: 2.41% coal, 40.58% oil, 32% natural gas, and 25.01% electricity. In Quebec, the breakdown was 1.1% coal, 42.02% oil, 14.41% natural gas, and 42.47% electricity. From the standpoint of annual GHG production, that represents emissions of 12 t of CO_2eq per capita, of which 9 t are attributable to the electricity sector, compared to 23 t per capita for Canada as a whole and 19 t for the energy sector (Ministry of Natural Resources and Wildlife, 2004 and 2006).

For electricity generation, emission levels for renewable energy sources would be the lowest, between 14 000 and 120 000 t CO_2 eq/TWh for hydro, wind and nuclear energy. The emission rate for natural gas is higher, at about 500 000 t of CO_2 eq/TWh, but this compares favourably with the emission rates of other fossil

fuels, which are 787 000, 999 000 and 1 022 000 t of CO_2 eq/TWh respectively for diesel, fuel oil, and coal (Hydro-Québec, 2006).

The proponent assessed the emission rates of natural gas and LNG using different emissions factors. GHG emissions rates for the complete production and use cycle of natural gas and LNG coming from Russia and being used in Quebec or in Ontario, would be about 6% higher than for natural gas from Western Canada (64 g of CO_2 eq/MJ for LNG compared to 60 g of CO_2 eq/MJ for natural gas). GHG emissions from LNG are about 49% less than for coal and 30% less than for fuel oil (DQ38.1).

The proponent emphasized that natural gas from LNG would be used mainly to replace other fossil fuels. According to the proponent, this would have the effect of reducing GHG emissions by about 40%, and other pollutants such as NOx (175%), SO_2 (800%), and particulate matter. Based on emissions factors provided by Environment Canada[1], the combustion of 500 million cfgpd of natural gas would generate about 10 000 000 t of CO_2 eq per year (PR8.7, Q-069; DA3, p. 4).

The Panel is not in a position to know exactly how the LNG from the project would be used, nor to what extent it would compete with other fossil fuels or substitute for renewable energies. However, it notes that Canada's energy policy is based on market forces, which means that the least costly energy sources will be developed more. In this context, extraction of coal is likely to increase in North America. On the other hand, the possible application of Canadian GHG emissions reduction measures would first target coal and oil, since these two sources emit more CO_2 than does natural gas. This reasoning, used in 2003 by the National Energy Board, was confirmed by the Government of Quebec that undertook in 2006 to achieve energy conservation targets that are relatively more significant for oil than for natural gas, for equivalent energy intensity (Ministry of Natural Resources and Wildlife, 2006, p. 44).

- *Finding – The Panel found that natural gas from liquefied natural gas emits more greenhouse gases than renewable energies such as hydroelectricity, but less than other fossil fuels, and for that reason it has a role to play in an energy strategy aimed at reducing greenhouse gas emissions.*

1. [On line (August 7, 2006): www.ec.gc.ca/pdb/ghg/inventory_report/1990_02_report/ann7_f.cfm]

Chapter 3 Integration of the project into the natural and human environment

The LNG terminal will be located in the Municipality of Cacouna and the MRC of Rivière-du-Loup, or, more specifically, north of the existing structures at the Port of Gros-Cacouna on vacant land belonging to Transport Canada (Figure 2). The project will be next to the western part of the Gros Cacouna peninsula, which also belongs to Transport Canada. The centre of the peninsula and the marsh beside it belong to Environment Canada. As for the eastern part, it is made up in part of private cottage land and land belonging to the Irving company (DB8 and DB8.1; Mr. Jacques M. Michaud, DT7 p. 120).

The Municipality of Cacouna was established on March 22, 2006 with the amalgamation of the village of Saint-Georges-de-Cacouna and the parish of the same name. The Malécite de Viger First Nation reserve, with an area of 0.202 hectares, is located within this municipality (Figure 4).

Approximately 7 km northeast of the proposed LNG terminal is the Municipality of Notre-Dame-des-Sept-douleurs, located on île Verte near the Municipality of Île Verte (Figure 1).

Background

At the end of the 19th century, the charm of the Lower St. Lawrence and the healthy salt-water air made Cacouna into a renowned tourist destination. The bourgeoisie went there by train or steamboat. Summer tourism, splendid villas belonging to wealthy families, and large hotels multiplied north of the chemin du Roi and the cliff[1].

In the 1950s, the Municipality of Cacouna opened up to industry. During this period, local promoters, wishing to ensure a connection between the Lower St. Lawrence and national and international markets, proposed development of a year-round deep-water port to the west of the Gros Cacouna peninsula. In 1965, a road linking highway 132 to the harbour was built and the construction of two breakwaters began. However, work stopped there and projects were scarce. Numerous negotiations with government authorities took place in the 1970s and finally bore fruit when, in the winter of 1980, the wharfs were completed. The Port of Gros-Cacouna opened on June 7, 1981 (DM2, p. 2 to 4).

1. [On line (June 19, 2006): http ://cacouna.net/tourisme19esiecle.htm]

Today, the port receives merchandise such as forestry products, sawmill lumber, various goods and bulk materials, but is still waiting for major industrial projects to be developed (*ibid.*). For the past few years, port authorities have even noticed a 50% decline in marine traffic. In 2005, 45 ships docked at the Port of Gros-Cacouna compared to 101 in 1997 (DQ6.1, p. 3).

This is the context of the LNG terminal project. Located in an industrial sector, the project would sit alongside a village that has kept some if its historic charm.

Human activity

Industry

The Port of Gros-Cacouna is the only commercial deep-water port between Québec and Matane that is accessible year-round. It has a harbour sheltered by breakwaters, a wharf with two berths, interior and exterior storage areas, a private hangar belonging to Terminaux portuaires du Québec, and a silo belonging to Ciment Québec inc. Since 2003, the Port of Gros-Cacouna has been part of the strategic network of commercial ports in Quebec (DM17, p. 1).

The LNG terminal would also be located near the Cacouna industrial park. With an area of 220 hectares, it is the second largest industrial park in Quebec, after Bécancour, but it remains underutilized with an occupance rate of 11% according to the municipality (DM16, p. 6; DQ11.1).

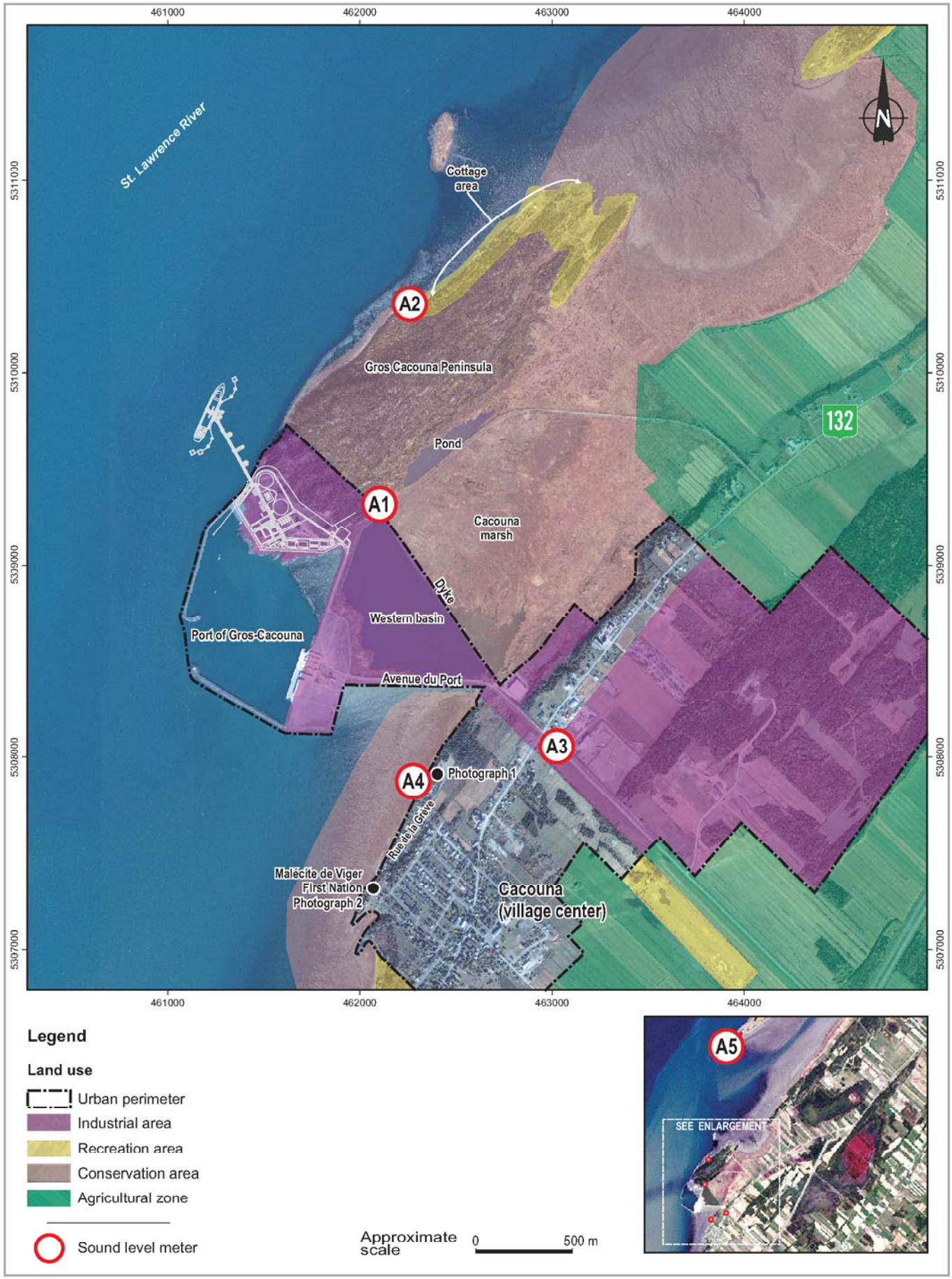
Hunting and fishing activities

Commercial fishing authorized in the Lower St. Lawrence includes mainly the American eel and species such as the rainbow smelt, Atlantic tomcod, alewife and lake whitefish. American shad and Atlantic sturgeon are also caught, as well as Atlantic herring.

Many sport fishers go to the Municipality of Cacouna wharf to fish for rainbow smelt, plaice, and herring. In the past, people also fished near the Gros-Cacouna port's breakwater, but in the past few years port authorities have forbidden access to vehicles. Only those on foot may still fish there. Ice fishing is also very popular between île Verte and the South Shore (PR8.2, Socio-economic Aspects, p. 84 to 87).

Waterfowl hunting is allowed in the fall at the Cacouna marsh and in certain areas of the Baie de L'Isle-Verte National Wildlife Area (DB9).

Figure 4 Land use in the vicinity of the project and location of sound level meters



Sources : adapted from PR3.1, Figures 3.2-1 and 5.4-2 ; DA46.2, Figure 6 ; DB6.2, Maps 5.3 et 23.1.

Recreation and tourism

Tourism on the Lower St. Lawrence is one of the economic development drivers in the region, being the third most important industry. Since 1998, the number of tourists and the resultant revenues have grown steadily. According to the Association touristique du Bas-Saint-Laurent, 897 businesses were involved in tourism in 2004, creating over 4,000 jobs. The Lower St. Lawrence stands out from other regions of Quebec because of its landscape and maritime character. This is the case for Cacouna and île Verte, the only island in the Lower St. Lawrence inhabited year-round and which attracts thousands of visitors every year (DM43, Appendix, p. 7).

As part of its tourism development strategy, the Association touristique du Bas-Saint-Laurent has targeted priority sectors such as marine tourism (excursions, cruises, water activities) and nature tourism (trails, parks, waterbodies). The Municipality of Cacouna's urban development plan also deals with this sector, because its development goals include protecting recreational tourism areas of regional interest near the river, and supporting the development of tourist routes and historical and natural sites (DM43, Appendix, p. 17; DQ29.1, p. 6).

Tourist routes

Major tourist routes cross the Municipality of Cacouna. The "Route des navigateurs", which follows highway 132, is used by many visitors because it connects many vacation areas in the region. There is also the "Route verte", which enables visitors to visit Cacouna by bicycle, passing through the Cacouna marsh to the Municipality of île-Verte. Finally, the "Route bleue du sud de l'estuaire" offers pleasure boaters, mainly kayakers, access between Berthier-sur-Mer and Les Méchins, passing through Cacouna for rest areas, safe shelters, or rustic campsites. This maritime route is an important attraction that is part of the region's eco-tourism development (DM11, p. 12).

Nature observation at Cacouna marsh and on Gros Cacouna peninsula

The Gros Cacouna peninsula was originally separated from land by a narrow arm of the sea. This was gradually closed off by deposition of material dredged and excavated during construction of the Port of Gros-Cacouna. Today, a dike has created a basin to the west and a marsh with high biodiversity values to the east (Figure 4*)*. The integrity of the Cacouna marsh is thus closely tied to water exchanges with the western basin during high tides, for example (DB39, p. 3).

The marsh is renowned by ornithologists as one of the top three bird-watching sites in the province. Each year, from three to five thousand visitors walk through the trails in

the marsh and on the Gros Cacouna peninsula to observe over a hundred species of birds and marine mammals, many of which have protected status (Figures 5 and 6) (DM61, p. 1; DB39, p. 1 - 4).

- *Finding – The Panel found that the LNG terminal project would be close to many important economic and recreation/tourism sites for the region.*

Protected wildlife habitats

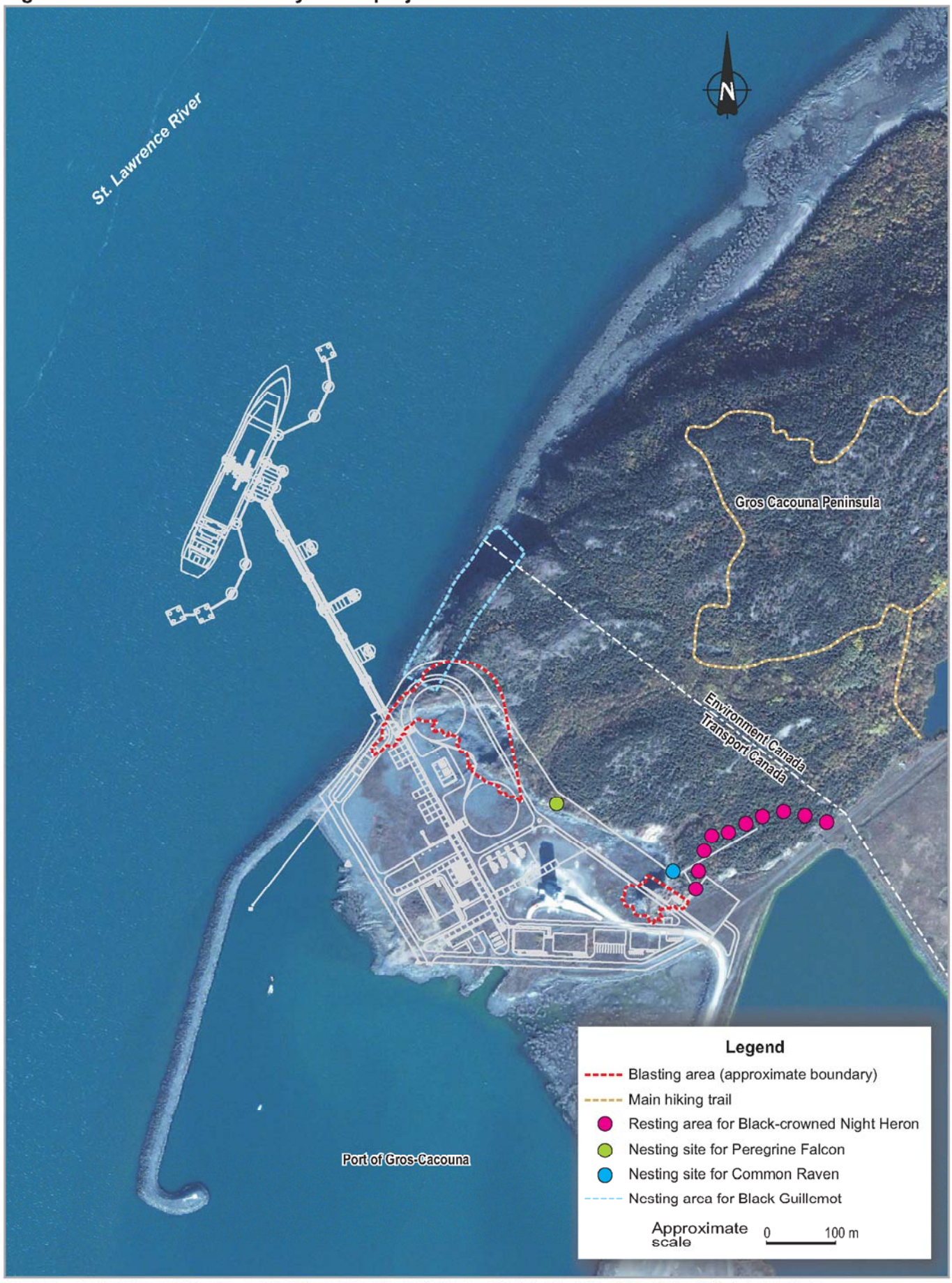
Because of its location in the Saint Lawrence estuary, the LNG terminal project would be near natural areas much valued for their biodiversity, such as the Cacouna marsh and the Gros Cacouna peninsula. The marsh is one of the 162 ornithological sites in Quebec classified as an "Important Bird Area (IBA)"[1] with a status of international importance. Moreover, under the Quebec *Wildlife Conservation and Development Act* (L.R.Q., c. C-61.1), the marsh and part of the estuary bordering the Gros Cacouna peninsula are designated as an "aquatic bird concentration area" and thus constitute valued wildlife habitats (Figure 4) (DB25).

The protection of the integrity of the marsh and the peninsula is important for Environment Canada. This department intends to annex the part of the Gros Cacouna Peninsula that it owns, as well as the marsh, to the Baie de L'Isle-Verte National Wildlife Area located east of the Port of Gros-Cacouna Harbour by 2010 (Figure 6). The MRC of Rivière-du-Loup supports this initiative. According to the MRC, "this designation is fully in line with the goal of protection and enhancement that is part of the revised development plan" (Mr. Louis Breton, DT2, p. 13; DT7, p. 26; DQ12.1, p. 2).

The Baie de L'Isle-Verte National Wildlife Area extends from one end of the île Verte bay to the other and overlaps part of the L'Isle Verte Migratory Bird Sanctuary. Created under the *Canada Wildlife Act* (L.R.C. (1985), c. w-9), the purpose of this reserve is to protect salt-grass marshes, a necessary habitat for American Black Duck. It also has protected status of international importance under the *Ramsar Convention on Wetlands*[2] (DB9).

1. The IBA program consists of identifying and protecting a certain number of sites, chosen according to bio-geographic criteria, so as to help maintain avian populations in a natural manner, taking into account the distribution range of the species for which a conservation approach by site is appropriate.
   [On line (July 31, 2006): www.naturequebec.org/ressources/fichiers/ArchivesEcoroute/zico2001/zico.htm]
2. The Convention on Wetlands is a treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. Signed in Ramsar, Iran, in 1971, it came into force in 1975. It is the only international treaty on the environment that addresses a particular eco-system. The Convention includes member countries in all regions in the world.
   [On line (July 31, 2006): www.wetlands.org/RSDB/default.htm]

Figure 5 Birdlife in the vicinity of the project



Sources : adapted from PR5.1, Figure QC-069 ; PR8.7, Figure Q-023-2 ; DA46.2, Figure 6 ; DB8 ; DB9 ; DQ1.1, Appendix 1.

Figure 6 Natural environment in the vicinity of the project

Sources : adapted from PR3.1, Figure 3.2-1 ; DA46.2, Figure 6 ; DB8.1 ; DB9 ; DB25.

The Îles de l'estuaire National Wildlife Area is also near the Gros Cacouna peninsula and consists of a string of islands stretching from Kamouraska to Le Bic. This wildlife area aims to protect nesting sites necessary for many species of colonial seabirds, such as the common Eider and the Razorbill. Finally, many "seabird concentration areas" also protect this area (DB10; DQ30.1, Appendices 1 and 2).

The Saguenay–St. Lawrence Marine Park is approximately 10 km north of Cacouna and covers the entire bed of the Saguenay River downstream from Cap-à-l'Est and the northern section of the St. Lawrence estuary (Figure 7). This park under provincial and federal jurisdiction aims to protect and develop the marine environment. For the moment, the south of the estuary is included in the marine park's coordination area. Since the creation of the marine park, the MRC of Rivière-du-Loup, the Association touristique du Bas-Saint-Laurent, and regional partners have made many representations to the authorities responsible to extend the limits of the park to the south shore of the estuary. The MRC participates in the park's coordination committee, and it hopes to integrate Rivière-du-Loup into the marine park as a welcoming point and thematic centre for the island's environment (PR6.2, p. 9-6).

In addition, Fisheries and Oceans Canada is currently evaluating the possibility of creating a "Marine Protected Area" in the estuary bordering the Saguenay-St. Lawrence Marine Park, which would extend west to the Loups marins foreshore and east to Métis-sur-Mer (Figure 7), thus encompassing the area targeted by the LNG terminal project. The St. Lawrence Estuary Marine Protected Area would be a complementary protection measure for the marine park, as it would ensure the conservation and long-term protection of marine mammals that live there year-round or that travel through, as well as their habitats and food resources. The creation of such a protected area would be accompanied by various land management measures, some of which, such as ship speed, may be regulated (DQ7.1.1, p. 3).

- *Finding – The Panel found that the area targeted for the LNG terminal is surrounded by wildlife habitats that are protected or in the process of being protected and are recognized as such provincially, nationally, and internationally. In this regard, the St. Lawrence Estuary Marine Protected Area Project could give rise to the regulation of certain activities that that could possibly endanger marine mammals.*

Land-use planning and compliance with development plan

According to the MRC of Rivière-du-Loup development plan, in effect since 1988, the Port of Gros-Cacouna area is considered a supra-regional port centre. The MRC has designated it a regional industrial port and the adjacent land was zoned for associated industries, including port activities. The expansion of these activities is part of the MRC's goal to improve its transportation system (DB6, p. 33 and 35; DM45, p. 2 and 3).

This orientation is also found today in the MRC's first revised land-use and development plan, adopted on May 20, 2004, which granted the Port of Gros-Cacouna area the status of a "multifunctional regional industrial area and area for siting large industrial complexes".

The MRC's goals regarding development of the Gros-Cacouna port area aim to maintain port and marine infrastructure functionality, and to pursue efforts to promote and develop the port (DB6.2, p. 5-13, 20-9 and plan 5-3; DM45, p. 3).

In this regard, the revised plan specifies:

> Various development and investment projects to be proposed in coming years in the port area, port improvement work, and related infrastructure may become necessary. Indeed […] new transhipment activities or an LNG project are to be anticipated in the port area or in the adjacent industrial park.
> (DB6.2, p. 20-11)

Municipality of Cacouna zoning specifies "public and institutional" use for the port area. Industrial use linked to public utilities, such as transportation services and natural gas distribution, is allowed. The Panel noted that even if public utility facilities such as a gas distribution system are permitted, it is not the same for hydrocarbon transhipment. The MRC explained that the powers granted to municipalities in relation to land use planning and zoning cannot be contrary to activities authorized by federal regulation. Section 31 of the Government of Canada's *Public Ports and Public Port Facilities Regulations* (DORS/2001-154) specifies that any person may, in a public port or at a public port facility, an activity set out in Column 1 of Schedule 4. The carrying out of "an oil transfer, a chemical transfer operation or liquefied gas transfer operation" is allowed at the Port of Gros-Cacouna. According to the MRC of Rivière-du-Loup, "with this federal regulation, a municipality cannot go and say something else […] without going against the Constitution" (DB7; DM16, p. 5 and 6; Mr. Nicolas Gagnon, DT5, p. 83 and 85).

- *Finding – The Panel found that the LNG terminal project is in accordance with regulations applicable to the Port of Gros-Cacouna.*

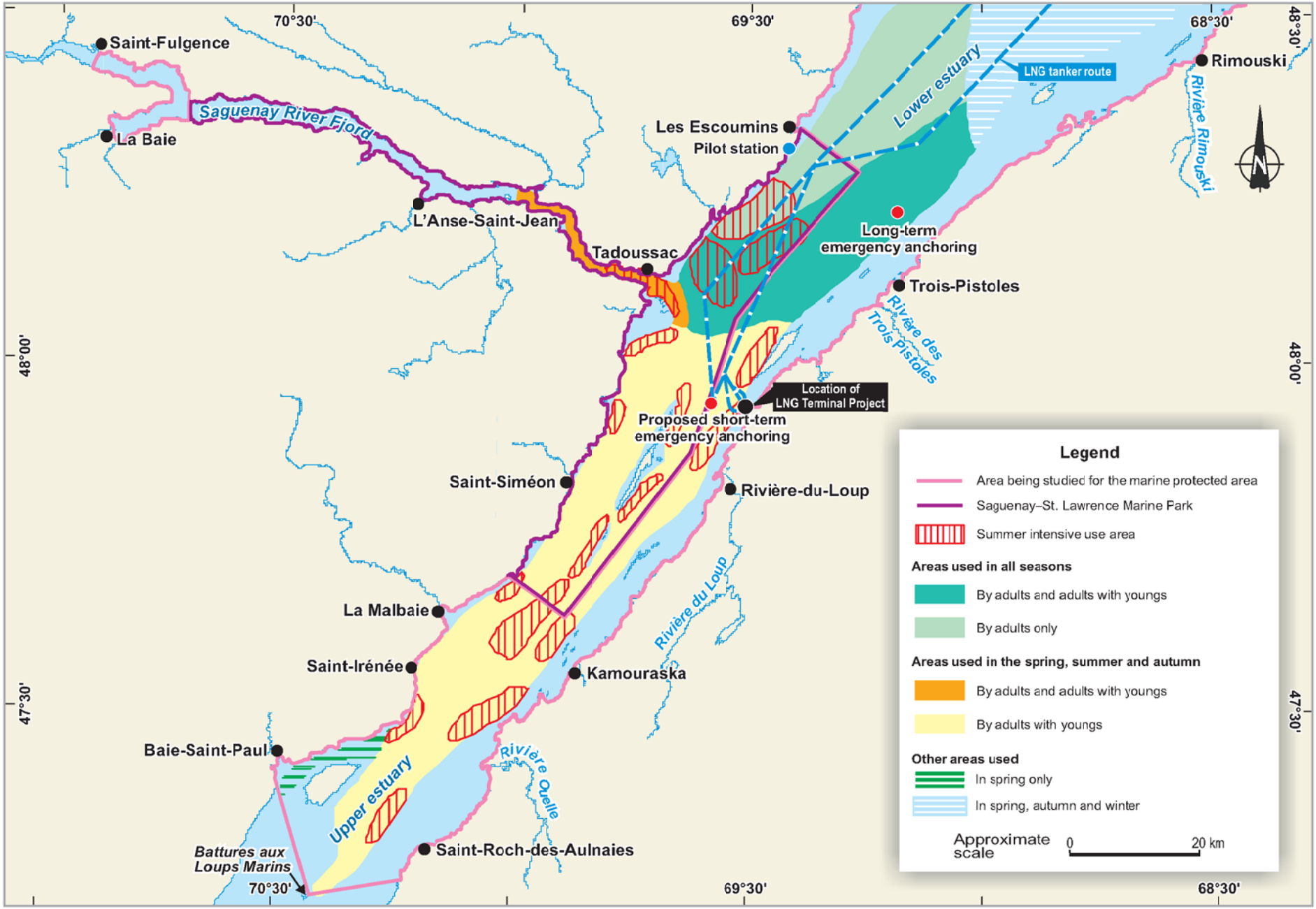
The industrial activities of the Port of Gros-Cacouna occur near numerous wildlife habitats that are protected or about to be protected by the governments of Canada and Quebec (Figures 4 and 6). More specifically, the Gros Cacouna peninsula and the marsh are mentioned in the first revised land-use plan. The MRC plans to maintain the protection of biodiversity for future generations and supports growth in recreational and eco-tourism activities. Moreover, the Gros Cacouna peninsula is designated as an "area of aesthetic interest" in the plan. This status is also given to the tourist route called "Route des navigateurs" that follows highway 132. As for the

Municipality of Cacouna's urban development plan, the St. Lawrence estuary and its shores have been zoned "conservation" with the dominant use being reserved for protection. Recreational activities as well as fishing are allowed under certain conditions (DQ29.1, p. 22; DB6.2, p. 9-11, 11-8 and 11-9).

- *Finding – The Panel found that the MRC of Rivière-du-Loup and the Municipality of Cacouna acknowledge the importance of the Port of Gros-Cacouna and its industrial area as well as wildlife habitats and neighbouring areas of aesthetic interest.*

- ***Opinion 9 –*** *The Panel is of the opinion that the Municipality of Cacouna and the MRC of Rivière-du-Loup will have a major challenge to meet in coming years, namely to conciliate industrial development of Cacouna and conservation of the adjacent natural sites dedicated to recreational activities.*

Figure 7 Seasonal distribution of belugas in the St. Lawrence River Estuary



Sources : adapted from *Canadian manuscript report of fisheries and aquatic sciences # 2647,* Fisheries and Oceans Canada (2003) ; PR8.7, Figure 2.3-2 ; cartographic sheet 21 M 01-200-0201 from the Base de données topographiques du Québec 1/20 000.

Chapter 4 Impacts on the natural environment

In this chapter, the Panel examines the project's effects on water and soil, as well as changes occurring to coastal processes. It then analyzes the project's effects on fish and marine mammals, as well as their habitats, by addressing the impacts stemming from the LNG terminal and shipping. Lastly, it examines the project's effects on terrestrial wildlife habitats.

Surface water management and water and soil quality

At this time, the majority of the surface runoff and stormwater from the project's site flows into the Gros-Cacouna harbour, with the rest flowing into the St. Lawrence Estuary. The proponent mentioned that, even though it was impossible to clearly define the drainage system at the project site, the grading plan would generally preserve existing draining patterns (PR3.1, p. 3-15 and 5-175).

Water management

The proponent presented a conceptual plan to manage and monitor the water. He estimated the amount of wastewater to be produced during the operating phase and discharged into the Gros-Cacouna harbour at 115,800 m^3/year. The proponent did not specify, however, how this plan would be implemented. The proponent anticipates a detailed plan that would include the terminal's final development plan and the facilities construction sequence determined by the selected contractor. During the construction and operating phases, surface water would be generated by precipitation, snowmelt, the cleaning of equipment, by water used for dust suppressants, water used in hydrostatic testing and operating discharges (PR5.1, QC-141 and QC-209).

According to the proponent's conceptual plan, cleaning zones would be established during the construction phase for machinery such as concrete mixers. These zones would include the required edging and berms to direct the water towards a lined ditch. The water collected by this ditch would then be trucked out of the worksite and processed at an accredited facility. The surface runoff and stormwaters stemming from the terminal's land-based facilities would be directed towards a settling tank which would empty into the St. Lawrence Estuary, passing through the Gros-Cacouna

harbour. Lastly, the surface runoff from the rock outcrop located north-east of the site would be collected by an intercepting ditch and directed towards the St. Lawrence Estuary without any prior treatment (PR3.1, p. 5-176–5-181; PR5.1, QC-141; PR5.2, QC2-33).

The proponent intends to implement some additional mitigation measures during the construction phase such as protecting stockpile sites and installing bypass berms and fences to entrap suspended solids carried by surface runoff and stormwater. Moreover, there would be no planned drainage of surface runoff towards the west basin or from other waterbodies located on the landlots (PR3.1, p. 5-176; PR5.1, QC-141).

Water is to be used for hydrostatic testing in order to test the integrity of the LNG tanks, pipes and overall equipment before using them. A maximum amount of 212,000 m^3 of water would be required for these tasks, which would then be discharged into the St. Lawrence Estuary from the Gros-Cacouna harbour. The proponent did not specify where the water for the tests would be taken from, as the amount required is too large to consider using the site's aquifer. If necessary, the water would be from offsite or even be drawn from the St. Lawrence Estuary. If needed, sodium hypochlorite would be used as a biocide to treat the water. The water discharged during the hydrostatic tests would have samples taken from it on a daily basis, and if required, it would be dechlorinated by injecting sulfur dioxide (PR3.1, p. 5-166; PR8.7, Q-105).

The proponent plans on building a water intake in the Gros-Cacouna harbour. This intake will only be used in the event of a fire at the LNG terminal (Figure 2) (DA46.2, Figure 6; DQ40.1, BAPE3-013).

When the terminal is in operation, the regasifying of the LNG would include the use of submerged combustion vaporizers that would produce discharges of lukewarm water between 15 and 20 °C, with a flow estimated at 0.003 m^3/s. The lukewarm water would be dispersed all along the terminal's jetty through diffusers in order to reduce possible impacts on local fish habitat temperature. According to Fisheries and Oceans Canada, the combined effect of currents, tides and waves would help limit the topical impact of water discharges from vaporizers. This water would be treated with sodium hydroxide in order to adjust its pH as required, and discharged directly into the estuary close to or from the proposed jetty (DQ21.1; PR5.1, QC-141; DQ1.6, BAPE23.3).

No information was provided on the noxiousness of various substances to be discharged into the effluents, specifically for marine wildlife. No information was provided on the noxiousness of various substances to be discharged into the effluents, specifically for marine wildlife. The proponent did not deem it necessary to plan for effluent toxicity tests, even though he planned to have a series of samples

taken for various important parameters during the operating phase. Nonetheless, all of the project's discharges must comply with the *Fisheries Act* (R.S.C. 1985, c. F-14). An effluent is considered harmful when it produces a substance that is harmful for fish or when it is acutely lethal for them (PR5.2.1, QC2-33; DQ15.1, p. 1 and 2).

In this respect, Environment Canada specified that the operator is responsible for making sure that the parameters used at the discharge location are sufficient to ascertain the noxiousness of the effluent. According to this department, there is a bioassay that can establish the lethality of an effluent[1]. It recommends that the proponent include this bioassay with his effluent monitoring program (DQ15.1, p. 2).

The proponent has set discharge environmental targets in compliance with the *Méthode de calcul des objectifs environnementaux de rejet pour les contaminants du milieu aquatique* (Method to calculate discharge targets for the aquatic environment contaminants) of the Government of Quebec, at the request of the ministère du Développement durable, de l'Environnement et des Parcs (MDDEP) (Ministry of Sustainable Development, Environment and Parks). The proponent plans to validate these targets with the ministry at a later stage of the project's environmental assessment, when the detailed project engineering for the effluent management facilities is available (PR5.1, QC-208; PR5.2.1, QC2-23 and QC2-33).

- ***Recommendation 2 –*** *The Panel recommends that Transport Canada require the proponent to provide a surface water management plan, including management of water from hydrostatic tests, from the time land preparation work begins. It also recommends that the proponent conduct follow-up on discharges into the St. Lawrence Estuary.*

Groundwater and soil quality

With respect to groundwater, a study from the proponent established that there may be a hydraulic connection with the St. Lawrence Estuary's surface water, and that the groundwater is affected by the tides. At low tide, the groundwater flow on the terminal's site is deemed to be radial towards the St. Lawrence Estuary, whereas at high tide, the flow is deemed to reverse towards the terminal's site (PR8.2, Hydrogéologie, p. 41).

The rock is situated at a shallow depth in the project's location, and the aquifer is considered to be highly vulnerable. Consequently, a contaminant that would be spilled on the ground would probably reach the groundwater in the rock. Given its seepage into the estuary, groundwater that would become contaminated through the terminal's

1. It is the 96-hour LC_{50} bioassay at a 100% concentration in rainbow trouts.

activities could impact the quality of the water and the aquatic habitat located nearby (PR3.1, p. 5-169; PR8.7, Q-108).

A characterisation report was submitted by the proponent, pursuant to the *Politique de protection des sols et de réhabilitation des terrains contaminés* (Policy for the soil protection and rehabilitation of contaminated land) of the Government of Quebec, in order to make sure that, on one hand, the chemical quality of the site's soil is in compliance with industrial usage and, on the other hand, that the background concentration is established at a level that will be maintained throughout the operating phase, and that would represent the rehabilitation baseline to be reached at the end of this phase. The characterization of the soil established that all the results are in compliance with property usage criteria, i.e. criterion C of the Policy and the threshold values of Appendix II of the *Règlement sur la protection et la réhabilitation des terrains* (Regulation on soil protection and rehabilitation of land) [Q-2, r. 18.1.01] (PR5.1, QC-230).

Operating the LNG terminal over a period of many years could, however, contribute to the degradation of the land and its groundwater through the use of hazardous substances such as diesel fuel for the stand-by generator. Moreover, accidental spills or breakdowns during the construction phase could contaminate the soil and groundwater. Transport Canada plans to require commitments from the proponent regarding soil and groundwater rehabilitation when granting the lease. In this respect, Environment Canada believes that the rehabilitation should be done in accordance with the *Politique de protection des sols et de réhabilitation des terrains contaminés* and the *Règlement sur la protection et la réhabilitation des terrains* of the province of Quebec, where relevant. As regards the criteria to follow, Environment Canada believes that the more restrictive criteria making up the two management frameworks of contaminated sites, i.e. the *Politique de protection des sols et de réhabilitation des terrains contaminés* of the Province of Quebec and the *Canadian Environmental Quality Guidelines* of the Canadian Council of Ministers of the Environment, should be considered. Lastly, the proponent commits to restore the site according to applicable legal provisions (DQ32.1, p. 1; DB38, p. 8; DQ1.3, BAPE12.3).

Modifications to coastal processes

Modifications to coastal processes target possible changes to the waves, currents and ice after the project is completed. These changes could impact the coast, the seabed sedimentation process or the stability of the shore ice.

Estuary hydrology

Waves

In the St. Lawrence Estuary, waves are more powerful during the winter than in the summer and swells are usually found as the wind is almost always present, blowing at more than 2 m/s 90% of the time. Waves sometimes reach more than 1 m in height, but rarely surpass 2 m. Extreme readings taken by the proponent in December of 2004, however, were of 3.1 m. A study by the proponent mentions that the scientific understanding of the estuary's wave patterns is not as detailed as for the gulf, in light of complex regional bathymetry and topography results (PR8.2, Processus côtiers, p. 11 to 15; DA8, p. 22 to 26; DA11, p. 5 to 33 and Appendix 1).

Tides and currents

The level of water in the estuary is regulated by a semi-diurnal tidal regimen. The mean sea level is 2.6 m and the mean tidal range is 3.7 m, while large mean tidal ranges can reach 5.3 m. The highest level ever recorded is 5.9 m. While tidal readings from the Rimouski station[1] show a stable sea level between 1985 and 2005, this level may nonetheless rise during the 21st century according to the Intergovernmental Panel on Climate Change, which bases itself on projected variations of thermal expansion and salinity in the upper layers of the oceans, as well as the water supply from polar ice and icebergs resulting from climate change. The Intergovernmental Panel states that sea levels may rise between 100 to 900 mm by 2100, according to the model used. In this respect, the proponent intends to factor in exaggerated tides, rising sea levels and storm surges when designing his facilities (PR8.2, Processus côtiers, p. 8; DA8, p. 4 and 5; Intergovernmental Panel on Climate Change (2001)).

Estuary currents stem primarily from tides which reverse their direction four times per day, from the St. Lawrence River's flow and lastly from the wind. Currents may deviate according to the shore's local morphology and the sea floor's bathymetry. The proponent's readings, taken close to the projected berthing wharf, showed currents that are generally parallel to the shore and whose flow velocity tends to be stronger during the ebb rather than the flood and which can reach peaks that are markedly higher than 1.5 m/s (DA8, p. 5 to 10; DA7, p. 24; DA11, p. 44 to 62; PR8.2, Processus côtiers, p. 16 to 26).

The proponent's data also showed that strong currents and significant swells in the area of the berthing wharf restrict the deposit of fine sediments on the shore and in

1. [Online (July 28, 2006): www.meds-sdmm.dfo-mpo.gc.ca/zmp/tide/meanslev_e.asp?st=R&s=RIMOUSKI&num=8]

shallow water. Sediment cores taken beside the LNG terminal's projected berthing wharf at a depth of approximately 15 m showed a predominant presence of sand, with a considerable proportion of silt and some clay. However, the presence of fine sediments is deemed to be greater offshore, as a result of decreased wave action and current strength. This also indicates that the seabed is currently in a natural sedimentation phase, whereas the shore is mainly in an erosion phase, as it is primarily rocky, with sediment plates present only in sheltered areas. Lastly, the absence of a stream mouth close to the projected berthing wharf and the fact that the estuary is not known for displacing large amounts of suspended solids limit the sediment input in this sector (PR8.2, Processus côtiers, p. 30 and 31; PR8.7, Q-043; DQ13.1, p. 5).

Ice

As a result of the estuary's strong currents and tides, the ice is mobile and drifts in the form of *floes*[1]. The estuary, including the approach route towards the terminal and the berthing wharf area, is therefore not iced-up throughout the winter. However, prevailing winds tend to regularly push the *floes* towards the south shore, fostering a denser ice cover there by piling blocks of ice up on the shore and in the dry area at low tide. In sectors that are fairly protected from the waves, such as the île Verte and the high ground, the ice cover can therefore be present throughout the entire winter (PR8.3, p. 5-38 to 5-41; PR8.2, Processus côtiers, p. 26; DA10).

The proponent's studies demonstrated that the ice cover can reach 120 cm in thickness in the estuary, but that the thickness of the cover ranges between 30 and 45 cm in the month of March. The ice forms between mid-December and mid-March, and is gone in April. There is little existing data on the shore ice, but pictures demonstrated that it can accumulate to a height of many meters. Stemming from shore ice breakage or the accumulation of conglomerated blocks of ice, some *floes* can reach 3 m in thickness and can present compact and solid sides because of refreezing. As the ice cover is subject to the winds and tides, rapid changes can occur in the estuary, and its ice can become frozen within just a few hours (DA10, p. 17, 22 to 34, 37 and 38, 46 to 48).

LNG terminal berthing wharf

The pilings of the berthing wharf and jetty would be 4.5 m in diameter and the footings would be between 40 m and 50 m apart. This configuration would allow for the free flow of water and would only result in a local deviation of the currents. Moreover, the

1. A drifting mass of conglomerated sea ice blocs.

pilings would result in wave refraction, coupled with a slight absorption of their energy. The berthing wharf would result in a localized erosion effect close to the pilings and would foster sedimentation close to the adjacent shore. The proponent plans on placing rocks at the base of the pilings to protect the seabed from the action of the waves, currents and LNG tanker propeller wash. However, berthed LNG tankers would likely act as a screen to the currents and waves and would protect the shore somewhat (PR3.1, p. 2-39 and 5-202; PR8.7, Q-109 and Q-110; DB41, p. 6; DA46.2).

- *Finding – The Panel found that the pile footings of the LNG terminal's wharf would allow the passage of waves and currents. Local changes to currents and waves would somewhat modify the sediment balance near the piles and between the wharf and the shore, but it would result in only a minor accumulation of relatively fine sediments between the wharf and the shore.*

- ***Opinion 10 –*** *Since the LNG terminal berthing wharf would protect part of the rocky shoreline on the Gros Cacouna peninsula from wave action, and since it appears that sedimentation will only occur in sheltered areas, the Panel is of the opinion that the berthing wharf would have a minor effect on the sediment balance at this location.*

The LNG terminal berthing wharf would absorb part of the waves' energy and it could provide an anchor for the sea ice, which would foster the formation of a stable ice cover between the wharf and shore, as demonstrated in a study by the proponent for the Ultramar berthing wharf at Lévis. The ice-deflecting dykes and tugboats would prevent normally drifting ice from accumulating around the berthing wharf. Available information also indicated that the projected wharf site currently tends to remain free from ice and that *floes* which drag onto the shore seem to remain there only for a few days (DA18, p. 6 to 8; PR8.7, Q-012; PR8.3, p. 5-38 to 5-41).

- ***Opinion 11 –*** *The Panel is of the opinion that, based on the proponent's studies, the LNG terminal berthing wharf would not have a significant effect on local ice dynamics.*

LNG tanker and tugboat traffic

LNG tanker and tugboat traffic would result in waves that would be especially noticeable in calm weather. The proponent used empirical equations to assess the contribution of these waves to the natural regimen. As a result, he estimated that passing LNG tankers would not contribute significantly to the energy of the natural wave regimen, as their contribution would be well below 0.1%. He also estimated that the overall traffic in the busiest area of the Seaway, i.e. seaward of des Escoumins, would contribute some 1% to the wave energy in this area (PR8.3, p. 5-27 to 5-38 and 5-42 to 5-45).

- ***Opinion 12 –*** *Based on the proponent's studies, the Panel is of the opinion that waves created by the movement of LNG tankers and tugs would not produce a significant effect on the St. Lawrence Estuary shoreline, and would not have a cumulative effect on wave energy.*

The LNG tankers would essentially navigate in an area of mobile sea ice from Les Escoumins to the terminal. The LNG tankers and tugboats would break up or deflect the *floes* they encounter, without causing fixed ice to break free. However, if the tugboats make Gros-Cacouna their home port, as is planned, then their comings and goings would break the ice cover that has been forming in the harbour in recent years, because of the low level of port activity in winter. The waves from the tugboats could also make the ice cover of the intertidal zone located in the south of the port brittle (Figure 4). In this respect, participants at the public hearing were concerned that the weakening of the ice cover in this area will allow storm waves to erode the shore during winter (PR3.1, p. 5-202; PR8.3, p. 5-38 to 5-42; PR8.7, Q-244; DA10, p. 16; DQ6.1, p. 3).

- ***Opinion 13 –*** *The Panel is of the opinion that passage of LNG tankers and tugs would not significantly modify ice dynamics. The use of the Port of Gros-Cacouna by tugs would nonetheless maintain an ice-free open water channel, and possibly make the neighbouring intertidal ice cover more fragile.*

- ***Recommendation 3 –*** *The Panel recommends that the proponent conduct follow-up on the icing conditions on the south shore of the Gros-Cacouna port entrance in order to understand the effect of repeated passage of tugs. In case shoreline freeze-up is impacted, Transport Canada should consider measures to limit the speed of tugs in this area.*

The ice bridge

In a different vein, the proponent does not expect the ice bridge connecting the île Verte to the mainland to be affected by the LNG tanker traffic. A group of experts hired by the proponent concluded that there will be no impact because of various factors, including the fact that the île Verte is an obstacle to waves from the sea and that there is a distance of 8 km between the bridge and the navigation routes of the LNG tankers (PR3.1, p. 5-202 and 7-13; DA18, p. 5 and 6).

The Panel underscored the fact that drifting *floes* absorb wave energy and that this energy is dissipated over distance in open water. It also recalled that, according to the proponent's calculations, LNG tanker traffic would add less than 0.1% to the wave energy in this sector.

- ***Opinion 14 –*** *The Panel is of the opinion that, based on the proponent's studies, the passage of LNG tankers should not affect the integrity of the winter ice-bridge linking île Verte to the mainland, in consideration of the distance, the reduced speed of the LNG tankers, and the fact that the area where the ice-bridge forms is protected from waves.*

Impacts of the facilities and marine traffic on fish, marine mammals and their habitats

In accordance with Article 2 of the *Fisheries Act*, the definition of "fish" includes fish in the biological sense of the word and their parts, but also includes shellfish, crustaceans, marine animals and any parts thereof (as the case may be, the eggs, sperm, spawn, larvae, spat and juvenile stages of these animals). Fish habitat, defined in Section 34, means spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes.

The proponent established an inventory of marine mammals in the immediate area of the LNG terminal, and then reviewed publications on the distribution of marine mammals and their use of various sectors of the study area. Even though the proponent performed a characterization of the habitats for the proposed jetty site, it did not undertake a fish sampling program, referring only to existing studies to complete the analysis.

Fish and invertebrates

Of the seventeen species of fish in the study area, two are designated vulnerable according to *An Act respecting threatened or vulnerable species of Quebec* (R.S.Q., chapter E-12.01). They are the rainbow smelt in the St. Lawrence Estuary and the American shad. As for the Atlantic sturgeon, it is a species that is likely to be designated threatened or vulnerable.

The study area is located in a migration corridor of Atlantic herring, capelin, American shad, Atlantic salmon and American eel. Occasionally, some juvenile Atlantic sturgeons can be found in the deep section of the study area. Spawning activity for rainbow smelts was observed for the first time in 2002 at the mouth of the rivière du Loup, one of the major reproductive habitats for this species on the estuary's south shore, in addition to the rivière Ouelle. Lastly, American shads can be found in the île Verte sector at about mid-May. These fish are spawners that travel up the St. Lawrence Estuary along the south shore to reach spawning areas in the Montreal

region (PR8.2, Poissons marins et leur habitat, p. 23; PR3.1, p. 3-24; DB11, p. 3; DB12, p. 7).

Impacts of project construction and operation

The construction and operation of the LNG terminal may impact fish and their habitats by threatening and destroying these habitats, generating suspended solids and increasing brightness. According to the proponent, the low levels of benthic organisms close to the berthing wharf and jetty suggest that this is not a very productive environment for them (PR3.1, p. 6-72).

The construction of the deflecting dykes, berthing wharf and jetty would require the excavation of some 50,000 m^3 of silty, sandy and clay-like material. According to the proponent, the type of underwater shovel to be used, as well as the method of excavating in caissons, would limit the amount of suspended sediment. Work would be carried out over two periods of eight months, during the time of year when there is no ice in the estuary. The jetty's pilings would be positioned during the first year, and those of the dock the following year. During the operating phase, the speed of LNG tanker propellers during their arrival at and departure from the berth could also result in local threats to fish habitats by suspending sediments anew. Fisheries and Oceans Canada does not plan on imposing limitation periods on the proponent for dredging operations, and indicated to the Panel that they had no major concerns regarding an increase in the rate of suspended solids during both the construction phase of the marine infrastructure and the operating phase (DQ21.1, p. 1; DQ41.1, p. 1; DA46.1, p. 5 and 12; DA46.2, p. 5 and 18).

Shads, smelts and especially eels are sensitive to an increase in brightness and noise. According to the proponent, in the event of stress, fish would probably avoid and circumvent the area close to the berth and pilings that is disrupted by work, which would therefore increase the energy expended by smelts and shads migrating upriver towards spawning areas. Eels migrating towards the sea could move with the current to avoid the disrupted area, which would limit their energy expenditure. However, as these species migrate mainly during the night, and as the construction of the marine infrastructures is slated to take place only during the day, the proponent believed that the potential impacts of construction activities on the migration of these species would be minor in importance (DB41, p. 3 to 7; PR8.7, Q-131).

Rainbow Smelt

The habitat of rainbow smelt in larvae and adult form must not be considered as a well-defined geographical location, but rather as a body of water which changes location horizontally and vertically, in accordance with tides and currents, and which is

used differently according to the age and size of the fish. Rainbow smelt larvae are often found in the intertidal zone located in the south of the estuary during the spring and summer seasons. Studies have also established a positive link between larval densities and the presence of salt-water cordgrass (*Spartina alterniflora*) vegetation. The rivière du Loup, located upstream of Cacouna, was recently identified as a spawning site for this species, and the rivière des Trois-Pistoles, located downstream from Cacouna, was also deemed to have great spawning potential, but would need restoration work (Giroux, 1997; Laprise and Dodson, 1989, p. 106 and 107; DB11, p. 2 to 6; Bourassa, 2005, p. 1).

The Gros-Cacouna harbour, as well as the projected sites for the jetty and berthing wharf, were not the subject of any sampling for larvae and juvenile specimens of smelt by the proponent or the Ministry of Natural Resources and Wildlife during the follow-ups done on this species. The potential for this sector is therefore unknown. As the mortality rate of the smelt's larvae can reach up to 97% in natural conditions, mortality resulting from the project's activities, such as pumping water in the St. Lawrence's Estuary as well as threatening and destroying habitats, may have an impact on the area's smelt population (DQ8.1, p. 1; DB11, p. 6).

During the operating phase, the pumping of ballast water at the estimated rate of 1 m^3/s, for a period of sixteen hours, every six days on average, would be necessary to maintain the stability of berthed LNG tankers. The proponent, when questioned by the Panel on this matter, was of the opinion that smelt, herring and capelin larvae would not be able to survive at a depth greater than 4 m, considering the conditions found around the berth. As the ballast water would be pumped from the dock at a depth of 9 m, he believed that this water would be in a lower region than the one where the larvae would be. The depth of 3 to 4 m in which the larvae are deemed to be during the summer was mentioned in a MRNF study (DQ33.1, p. 1 and 2; DB11, p. 6).

However, current knowledge of juvenile rainbow smelt does not allow determination of the depth at which they can develop. In order to limit possible impacts when pumping ballast water, the proponent plans to install screens at the end of LNG tanker water intakes, in accordance with the *Freshwater Intake End-of-Pipe Fish Screen Guideline*, published by Fisheries and Oceans Canada, to avoid pumping fish. However, this guideline targets water intakes with a maximum rate of up to 0.125 m^3/s, which is much less than 1 m^3/s, and it was created to protect freshwater fish with a minimum fork length of 25 mm. Consequently, the proponent did not prove to the Panel that the mesh size required for the planned rate when pumping water would prevent the suction of juvenile fish (PR8.7, Q-014; DQ33.1, p. 2; Fisheries and Oceans Canada, 1995, p. 1 to 12).

No information was provided by the proponent on the time of year chosen for the planned hydrostatic testing to be done during the construction phase, which will require the pumping of a maximum amount of 212,000 m^3 of water from the estuary, or regarding the mitigation measures that would be implemented to specifically avoid pumping larvae and juvenile fish.

- *Finding – The Panel found that large quantities of water would be pumped from the St. Lawrence estuary for hydrostatic tests and for LNG tanker ballast water, and that this water could contain juvenile fish including species having protected status.*

- ***Recommendation 4 –*** *The Panel recommends that the effectiveness of the mitigation measures planned to prevent entrainment of larvae and juvenile fish during hydrostatic tests, construction of the LNG terminal, and LNG tanker ballast water pumping operations should first be demonstrated by the proponent to the satisfaction of Fisheries and Oceans Canada and the Ministry of Natural Resources and Wildlife.*

Compensation for loss and disruption to fish habitat

Under the provisions of the Department of Fisheries and Oceans' *Policy for the Management of Fish Habitat*, the no net loss principle must be applied when there is disruption or destruction of fish habitat, in accordance with the *Fisheries Act*. Constructing marine infrastructure would result in the loss of some 18,800 m^2 of fish habitat. The construction structures and equipment in the marine environment would also result in the temporary encroachment on the same kinds of habitat. The proponent, in collaboration with the Department of Fisheries and Oceans Canada, plans to develop an approach to compensate for the loss of fish habitat (DA46.2, p. 18).

The proponent plans to install a temporary dock at the eastern end of the Port of Gros-Cacouna wharf to unload and moor tugboats. However, no information has been provided on the dimensions of this temporary dock and its impacts on the environment, including the loss of habitat. Moreover, the eastern half of the Transport Canada wharf would be used by the proponent during the construction phase of the LNG terminal (PR3.1, p. 2-81; DQ34.1; DQ40.1, BAPE3-005).

Regarding the presence of LNG tankers at the berthing wharf, Fisheries and Oceans Canada considers the area occupied by them as a degradation that must be compensated for (DB41, p. 5 and 6). The Panel also noted that if part of the berthing wharf encroaches on Government of Quebec lands, the proponent would need to obtain a license of occupation from the Province to build the wharf[1].

1. [Online (August 24, 2006): www.cehq.gouv.qc.ca/domaine-hydrique/gestion/cadre_2-3.htm#permis_occ]

The proponent submitted to the federal authorities, namely Fisheries and Oceans Canada, Transport Canada and Environment Canada, several options for the management of excavated material. The federal authorities consulted each other in order to analyze the various options, and agreed to ask the proponent to favour a land-based management approach. Environment Canada advocates the disposal of sediments on lands that are the object of a demand for a lease by the proponent. Transport Canada has indicated it is willing to analyze this option, as well as the option of land disposal on the west side of the west basin. The federal authorities plan to request from the proponent an environmental assessment of the preferred option to make sure that the disposal of sediments will not interfere with the port's future development, and that it will maintain the hydraulic connection between the marsh, the west basin and the Gros-Cacouna harbour. The proponent intends to complete its study of the options for the management of the excavated material taking into account the concerns of the federal and provincial authorities. For the Panel, the management of excavated material in a land-based environment should not result in additional hazards for the coastal population, such as numerous trips by heavy trucks (DQ41.1, p. 1; DQ 42.1 p. 1; DQ42.1.1, p. 1; DQ43.1, p. 1 and 2; DQ44.1, p. 2; DQ49.1).

As for Environment Canada, the MDDEP underscored the importance of knowing sediment toxicity and granulometry, as well as management and treatment methods used, in order to assess the environmental acceptability of the chosen solution. In this respect, the proponent planned to perform some work in order to ascertain the chemical composition and toxicity of the sediments excavated. In the event of a contamination, it commits to dispose of them in an authorized land site (DQ44.1, p. 2; DQ43.1, p. 2).

Due to the presence of the saltwater intake in the Gros-Cacouna harbour, compensation for impacts on fish habitat may be required if Fisheries and Oceans Canada establishes that there is a degradation of the habitat.

- ***Recommendation 5 –*** *The Panel recommends that the solution chosen by the federal and provincial governments to manage the dredged material not result in additional hazards and safety problems for the population in the surrounding area.*

- ***Recommendation 6 –*** *The Panel recommends that the proponent provide information to Transport Canada, Fisheries and Oceans Canada, and the Ministry of Sustainable Development, Environment and Parks concerning the construction, operation and dismantling of the temporary dock that will be used to build the LNG terminal within the framework of this environmental assessment. The proponent shall establish the impact of this work on the natural environment and on the port's operations, as well as on the habitat areas to compensate, if necessary.*

In spite of all of these expected impacts on fish habitat, the proponent did not present any compensation program for the loss and disruption of fish habitat in the environmental impact assessment, or in the changes to the project made in August and September of 2006, even though this information is required in the environmental assessment guideline. Therefore, the Panel is unable to establish the significance of the project's residual impact on fish and fish habitat (PR2.1, p. 34; DQ35.1, p. 1).

- ***Recommendation 7 –*** *The Panel recommends that the proponent's fish habitat compensation plan for losses and disturbances to fish habitats be filed at Fisheries and Oceans Canada under the current environmental assessment.*

Marine mammals

The St. Lawrence Estuary is both a rich natural environment for marine wildlife and a major seaway to ship and exchange goods with Canada's central regions. It is recognized as a major feeding area for numerous species of marine mammals because of high concentration levels of prey found there, such as krill and capelin. Many cetaceans migrate there every year, including many large whales, to feed and build up their energy reserves in preparation for the breeding season.

Potential hazard sources for marine mammals during the construction phase will be essentially generated by the noise made during the building of the marine infrastructures, including the traffic of barges and other marine equipment. The anticipated impacts arising from navigation are collision risks and hazards resulting from the presence of ships and the noise they would generate. These impacts could result in the displacement of marine mammals that are frequently found in certain parts of the LNG tankers' projected approach route.

Pinnipeds

Four species of seals can be found in the estuary: harp seals, hooded seals, grey seals and harbour seals, with the latter being the only species residing in the estuary year-round.

It seems that the coastal flats of the Rocher Percé are the main site in the sector where grey seals can be seen. As for harbour seals, their main haulout site would seem to be located on the coastal flats of the île Ronde, in the region of the île Verte. Seals seem less present on the south shore of the St. Lawrence Estuary (Figure 1). The major agricultural development that has occurred in this region, as well as the numerous summer residences found there could be an explanation for this situation (PR8.2.1, Addenda – Transport maritime, p. 1-14; Lavigueur, Hammill and Asselin, 1993, p. 11 and 30).

Seals are not often killed through collisions with ships, mainly because they are too quick and agile. The reaction of harbour seals would vary between avoiding their haulout sites if approached, being on the lookout without leaving for lesser disturbances, and becoming habituated. Marine traffic may cause some seals to avoid feeding areas. A ship that performs frequent approach manoeuvres could also disrupt their reproductive, birthing and haulout habits. The data compiled to date, however, seems to indicate that seals generally tolerate the presence of ships (DQ21.1, p. 1; PR8.3, p. 6-15).

Cetaceans

There are four species of cetaceans that are frequently observed in the estuary (belugas, harbour porpoises, fin whales and minke whales), while nine other species are found in the Gulf of St. Lawrence (white-beaked dolphins, Atlantic white-sided dolphins, killer whales, long-finned pilot whales, sperm whales, humpback whales, northern bottlenose whales, blue whales and North Atlantic right whales). Fin whales, humpback whales and blue whales are part of the list of species that are likely to be designated threatened or vulnerable according to *An Act respecting threatened or vulnerable species* of Quebec. The Atlantic fin whale population has been deemed to be a "Special Concern" by the Committee on the Status of Endangered Wildlife in Canada, but to this day, it does not benefit from any protected status under the *Species at Risk Act* of Canada. Atlantic Fin whales are present in the study area, mainly in the sector between Tadoussac and the île Rouge. Blue whales are considered "endangered" under the *Species at Risk Act* of Canada[1].

The belugas of the St. Lawrence are considered to be a relict population that is separate from those in the Arctic, and appear to be isolated geographically. This population has also been designated as "endangered" under the *Species at Risk Act of Canada* and *An Act respecting threatened or vulnerable species* of Quebec. Both the size of the beluga population in the St. Lawrence Estuary and its geographic summer range have decreased in relation to estimates made at the beginning of the 20th century. This decrease in population has been attributed to commercial whaling, and even thought it has been protected since 1979, it does not show any signs of recovery. Figure 7 presents the seasonal distribution of belugas and the areas they frequent. They tend to form groups that are characterized by gender, age and the presence of juvenile members, and their distribution pattern probably reflects the ecological and behavioural needs of the groups. The high rates of visits by belugas, the evidence of predation, prey distribution and the presence of young members prove that the sector of Cacouna supports, to an unknown degree, their feeding and

1. *Species at Risk Act* Public registry. [Online (July 2006): www.registrelep.gc.ca]

reproductive habits (PR8.2, Mammifères marins, p. 9; PR8.2.1, p. 1-4 to 1-5; The St. Lawrence Beluga Recovery Team, 1995, p. 7 to 11; DQ21.1, p. 4 and 5).

Collision risks

According to Fisheries and Oceans Canada, the highest risks for collisions are found in the intensive feeding areas of great whales located between the île Rouge and Tadoussac, where currents concentrate their food in specific locations. A study revealed that any type of ship can enter into a collision with marine mammals, but that major or fatal injuries to these animals are caused by ships that are 80 m and more in size. This study also showed that the most serious injuries and deadly strikes are caused by ships travelling at a speed that is equal or greater to 14 knots or 26 km/h (DQ21.1, p. 1 and 4).

Collisions with large commercial vessels are not considered to be a major cause of death for St. Lawrence belugas. There also seems to be a low collision probability with big ships sailing at a constant speed and direction. The proponent expects LNG tankers would travel towards Cacouna at a speed of 10 knots or less when leaving Les Escoumins, then at 5 knots when passing closest to île Verte, and finally at 2 or 3 knots at 2 km from the LNG terminal (The St. Lawrence Beluga Recovery Team, 1995, p. 12 and 26; PR8.2; PR8.3, p. 6-16 and 6-17; Mammifères marins, p. 2-5).

- *Finding – The Panel found that the constant direction and reduced speed of LNG tankers travelling from Les Escoumins to Cacouna would lower the risk of collision with cetaceans in this sector.*

Marine noise and wildlife

The potential sources of disturbance to marine mammals, seabirds or fish during the construction phase would mainly stem from airborne or underwater noise caused by machinery, including barge and ship engines and pile driving. During the operating phase, the main sources of noise would be LNG tankers and tugboats.

Airborne noise over water

Construction noise

Contrary to whales, seals remain on the shore or the ice at times to rest or give birth to pups. Their response to airborne noise would vary in accordance with sound intensity, sound attenuation and the ambient noise level. The response of a single species could range from tolerance and habituation to avoidance, and may even result in the dispersal and redistristribution of local populations should the ambient

noise level deteriorate too much, although few studies have been done on this subject (PR3.1, p. 6-90 to 6-96; Richardson, 1995, p. 280 and 281).

During the construction phase of the LNG terminal, the proponent assessed the noise level at the Rocher Percé, where the main haulout site is located, at 35 dBA with pile driving activity and 30 dBA without. The proponent did not believe that there would be any significant impact on the ambient noise level for this receptor. Lastly, primary blasting is slated to take place only once a day. It may, however, result in a momentary disturbance (startle the seals) given the peak noise level of 66.9 dBA for this receptor (PR8.7, Q-062; DQ40.2, BAPE03-011).

In short, the proponent does not anticipate that the haulout sites of the Gros-Cacouna region will be abandoned, as the noise associated with construction work would dissipate quickly.

- *Finding – The Panel found that, based on the proponent's data, the aerial noise from construction of the LNG terminal would be sufficiently dissipated before reaching the nearest seal haul-out sites that it would not significantly affect their use.*

Noise during the operating phase

As for the construction phase, the proponent's modelling does not indicate any significant impact on the haulout site of the Rocher Percé during the operation of the LNG terminal, without any shipping activity, with a noise level estimated at 26 dBA, which is less than the current ambient noise level.

The sensitivity of seals to the noise made by ships is deemed to be less acute in the air than underwater, with a maximum hearing frequency that is close to 20,000 Hz. Noise may cause some seals to flee or may disrupt their activities. Moreover, observations seem to indicate that seals may dive when a ship approaches them between 100 to 300 m, even though they may have become tolerant through habituation (PR8.7, Q-240; PR8.3, p. 6-11; Richardson, 1995, p. 252 to 255).

The proponent does not expect the seals to abandon the haulout sites of île Rouge and Rocher Percé as the ambient noise generated by marine traffic would only occur for a few minutes at a time, and would be attenuated sufficiently before reaching these two sites (PR8.7, Q-133; PR8.3, p. 6-15).

Birds on the water or who nest close to the LNG tankers' route could also be disturbed by the tanker traffic. Responses in this case also may range from tolerance to avoidance. The proponent believes, however, that an LNG tanker's local transit time would only cause a short and occasional noise disturbance for the colonies of île

Rouge and île Verte, both located at more than 1 km from the LNG tankers' route, and thus the ambient noise level would remain unaffected. As for the Black Guillemot colony located very close to the planned site of the berthing wharf's jetty, the section below will address it more specifically (PR8.3, p. 6-32 to 6-39).

- *Finding – As with construction, the Panel found that, based on the proponent's data, the aerial noise from marine traffic between Les Escoumins and Cacouna would have dissipated enough before reaching the seal and bird colonies in the area so as not to represent a major impact source.*

Underwater noise

Some fundamentals concepts

Underwater sound is measured in decibels, just like airborne sound. To compare airborne levels to underwater levels, airborne noise must be increased by 62 dB to take into account the difference in the ambient environment, as well as the different conventions to measure sound pressure. Moreover, sound can be broadcast over a broad spectrum to globally estimate a sound source or through frequency bands, to locate dominant frequencies. To assess the impact of a sound source on humans, audiograms are adjusted to the hearing sensitivity of humans and are expressed in dBA[1]. Regarding broadband underwater sound sources measured at 1 m with a reference pressure of 1 micro Pascal, units would be expressed as follows: dB re 1 µPa @ 1 m. To simplify, the Panel will only use the symbol dB at 1 m (BAPE, 2004, p. 12 and 46; Richardson, 1995, p. 17 to 21).

Marine mammals, including seals, are sensitive to underwater sounds to varying degrees, according to the species. It is hard to perform experiments on them without risking injuries, this being especially true for species where no members are held in captivity. Consequently, their vocalization frequencies are often used to estimate their sensitivity to naturally-occurring or man-made noises (PR8.7, Q-045, Q-114, Q-117; Richardson, 1995, p. 205 to 240).

For example, beluga whales or harbour porpoises, which are toothed whales, are deemed to communicate at frequencies between 260 Hz to 20 kHz, but can also use higher frequencies between 40 to 60 kHz and 100 to 120 kHz when emitting powerful echolocative clicks. To communicate, minke and fin whales, which are baleen or toothless whales, are deemed to use frequencies below 5 kHz and frequencies between 3 and 30 kHz to echolocate (Richardson, 1995, p. 163, 164, 172, 183 and 330).

1. [Online (July 28, 2006): www.akustar.com/dossiers/glossaireD.htm]

Fish sensitivity to sound is less documented than for marine mammals. Fish would move away from sound sources if bothered, or would behave differently. Plankton, larvae or juvenile fish could die or become injured should they drift within a few meters of an intense noise source. As for crustaceans, they are deemed to be relatively insensitive to moderate sources of man-made noise (PR8.7, Q-114; PR8.3, p. 6-58; DQ7.1.1, p. 5; DB41, p. 3; BAPE, 2004, p. 59 to 61).

The Panel used the 120 dB level in its analysis to estimate possible marine mammal avoidance reactions and behaviours, as well as the effects of communication masking and interference, with the 140 dB level being used for damage caused to hearing through sustained exposure and the 180 dB level for short bursts that may damage hearing. These threshold values are frequently used to assess the effect of sound sources on marine mammals and to propose mitigation measures. However, it is important to consider that sensitivity varies according to species and even individual members, and that subtle effects can even occur at very low levels of exposure (Richardson, 1995, p. 334 to 350, 366 and 373; DA2, p. 26 to 28; DB41, p. 3).

In September 2005, the proponent took readings of the underwater sound environment close to the proposed site for the LNG terminal up to the middle of the estuary and performed sound propagation tests. They did not, however, extend the study area to include the main shipping channel because they believed that the passage of carriers would have a negligible cumulative effect as the current traffic level is very high. Fisheries and Oceans Canada does not have any studies on the sound impact of shipping traffic in the estuary, but as this sector of the St. Lawrence River is visited often by several species of marine mammals, the Department informed the Panel that it had recently taken readings at the beginning of the Laurentian Channel. The analysis of this information is in progress (DA2, p. 17 to 19, 32 and 33; PR8.7.1, Q2-33; DQ7.1.1, p. 4).

Simple propagation models forecast a cylindrical dispersal pattern of sound in the estuary with a theoretical attenuation coefficient of 10[1], given the shallow water depth. The proponent's readings showed an attenuation coefficient of 17 seaward of Cacouna in September of 2005, which means that noise was attenuated more easily than planned at that time. The silty texture of the seafloor and the bathymetry could explain this improved attenuation effect (PR8.7, Q-159; DA2, p. 29; DQ1.5, BAPE-9.4; DQ7.1.1, p. 4; BAPE, 2004, p. 34 to 40).

1. Noise is attenuated according to the following formula: n log R, where R represents the distance and n the attenuation coefficient which includes factors influencing the attenuation, such as density, salinity and water temperature, depth, the nature of the seafloor and the frequency of the acoustic wave.

The LNG terminal

The methods used to construct the berthing wharf and jetty initially included various sources of underwater noise, such as pile hammers and vibrating pile drivers, as well as barge and tugboat engines. According to the proponent's data, sheet-pile driving represents a major noise source, with bursts of 216 dB at 1 m. According to the proponent's simulations, a sound intensity greater than 180 dB would have been recorded within a radius of some 130 m, 140 dB at approximately 4,000 m and 120 dB at more than 10,800 m when taking pile driving and other worksite noise sources into account. As pile driving can disturb or injure cetaceans or pinnipeds that come too close, the proponent proposed to use trained personnel to monitor the movements of marine mammals and have the work stopped on a temporary basis if required. Vibration pile driving emits instead a continuous and weaker sound. With levels of 164.3 dB at 1 m, it is less noisy than normal pile driving or even barge and tugboat engines. By taking vibration pile driving and other worksite noise into account, sound emission of less than 120 dB would have been recorded at a distance of 1,600 m, and it would have been greater than 140 dB only in the immediate vicinity of the worksite. As such, vibration pile driving would diminish the risk of injuries to marine mammals considerably, and would also lessen work noise in the estuary significantly (DA2, p. 38 and 39; PR8.7, Q-045; PR8.7.1, Q2-31).

To this end, the proponent planned to favour the use of vibration pile driving to build the berthing wharf and jetty, and planned to use regular pile driving only when the presence of boulders buried in sediments would have rendered the use of sonic pile drivers ineffective, i.e. less than 5% of the total work time (Mr. Mario Cantin, DT5, p. 63; DA46.2, p. 3).

Without specifically explaining the consequences feared, Fisheries and Oceans Canada was opposed to the sheet pile driving from mid-June through mid-September, both with regular and vibration pile drivers, because it considers the sector seaward of Cacouna as a summer habitat of primary importance for female belugas and their newborn calves (PR8.4, p. 10; DA10, p. 39 to 48; DQ7.1.1, p. 6; DB41, p. 5; DQ28.2). Consequently, in August of 2006, the proponent presented a solution to the Panel which involved pile driving only approximately thirty steel cylinders into the seafloor instead of hundreds of sheet piles. They specified that this new approach required more mobile marine equipment, dredging to install the concrete caissons, and a 24-hour work schedule. However, they noted that the driving time would drop from 80 hours every week to 3 hours (DA46.1; DA46.2; DQ40.1, BAPE3-008).

When questioned by the Panel, Fisheries and Oceans Canada stated that they considered the new construction approach acceptable, but under certain conditions. The Department would require the implementation of a safety exclusion zone at one

kilometre from the worksite, and monitoring by trained personnel who would stop the work temporarily if marine mammals ventured into this perimeter. Moreover, the Department plans to make sure that the pile driving is carried out during periods of the day when belugas are less likely to be present. Lastly, it plans to require the proponent to validate the underwater sound dispersal model on site and modify the safety exclusion zone as required, according to the results obtained (DQ41.1).

The addition of tugboats and water craft required by the new method would degrade the ambient acoustic environment compared to the initial concept except when driving piles, when noise levels would appear to be the same. The analysis of this new approach demonstrated that outside the pile driving periods, underwater noise levels would be higher than those produced by the initial approach, as the noise made by the barges and tugboats would be greater than that of the vibration pile driving.

The Group for Research and Education on Marine Mammals (GREMM) expressed their concerns over the new construction approach to the Panel. The GREMM found the old approach too noisy for belugas, and did not necessarily deem the new approach to be an improvement. In their view, the proponent should still refrain from building the berthing wharf between June and October, in order to not make belugas flee from the sector located between Cacouna and the île Rouge (DM73; DC32).

The berthing wharf would be located in the migration corridor of several species of fish. Fisheries and Oceans Canada was of the opinion at the outset that no pile driving should occur at night from May 15th to the 31st, in order to protect the migration of American shad and Atlantic herring, two species that are sensitive to noise. However, the proponent does not plan to pile drive at night (PR3.1, p. 6-72; DB41, p. 6).

- ***Opinion 15 –*** *Even thought the new construction method for the berthing wharf and jetty proposed by the proponent in August of 2006 may be deemed acceptable by Fisheries and Oceans Canada, the Panel is not convinced that it is more beneficial than the initial approach, which advocated the use of vibration pile drivers to avoid disturbing belugas with underwater noise during the summer.*

- ***Recommendation 8 –*** *The Panel recommends that if Fisheries and Oceans Canada authorizes work in the marine environment to build the marine facilities of the LNG terminal, then this department should ensure that the mitigation measures required from the proponent are effective, or propose other measures.*

Navigation

Ships are deemed to emit sound continuously mainly at frequencies that are less than 1,000 Hz from their engines, propellers and the frictional drag of water. It would seem

that the tolerance levels of belugas and whales vary greatly throughout the year, according to the essential activities they take part in, their familiarization with the noise source or the ship's behaviour. Belugas and whales would flee from ships behaving erratically and their vocalizations would sometimes be modified by the approach of a ship, even if they exhibited a tolerance for the noise source by not moving. In the Arctic, where shipping traffic is less intense, belugas are deemed to exhibit avoidance behaviour for the sound of ice that is broken by icebreakers navigating at speeds greater than 35 km/h (PR8.7, C-025; Richardson, 1995, p. 172, 183, 255 to 271 and 330).

Readings from the proponent suggested that the noise is more intense in the north channel of the estuary, with levels of 104 to 107 dB for the quietest hour, i.e. when there are no ships near the recording site, than in the south channel, where levels are between 95 to 100 dB. Moreover, a reading change-over point located at three or four km from the north channel seaway clearly indicated that the acoustic signature of ships navigating in the Seaway generated levels beyond 120 dB in frequencies from 50 to 1,000 Hz for some 20 minutes every time. Readings showed that the acoustic impact of ships is much less detectable approximately 5 km from the north channel (DA2, p. 11 to 17, Appendices A-6 and A-7).

- *Finding – The Panel found that, based on the proponent's surveys, the underwater noise environment in the estuary's northern channel is more affected by marine traffic than is the southern channel. Moreover, it is shown that the underwater noise impact from ships is felt over several kilometres.*

The proponent estimated that an LNG tanker approaching the terminal and travelling at a reduced speed of 10 knots would generate a noise level of 174.6 dB at 1 m. With an attenuation coefficient of 17, this noise level would drop to less than 120 dB at a distance of approximately 1,800 m. With respect to a docking scenario involving tugboats, the proponent estimated a radius of 700 m before the sound level would be less than 120 dB. It estimated that the sound of LNG tankers and tugboats would be intermittent and temporary for any given location in the shipping channel. Consequently, the proponent did not anticipate any significant impact on the underwater wildlife and did not propose any mitigation measures (DA2, p. 33 to 37; PR8.3, p. 6-57 to 6-59; PR8.7, Q-045).

The noise level generated by large vessels is deemed to be greater at frequencies below 100 Hz. As the belugas' preferred hearing band is greater than this level, the frequency spectrum corresponding to LNG tankers would produce tone bursts lower than 165 dB to 1 m, and the distance required to attenuate these frequencies below 120 dB would be approximately 500 m. However, as the preferred hearing band for fin or minke whales is at lower levels than the one of belugas, this same area for them

would extend instead to 1,800 m from the vessel (PR8.7.1, Q2-32 to Q2-40; Richardson, 1995, p. 162, 163, 172 and 173).

As such, belugas or other marine mammals that are close to the LNG terminal may adopt avoidance behaviour for LNG tankers approaching or leaving the terminal, be they accompanied by tugboats or not. Cetaceans that would be disturbed could then remain at distances ranging from hundreds of meters to more than 1 km from moving LNG tankers. As belugas and other cetaceans aren't found very often in the sector seaward of Cacouna during the winter because of ice, this increase in the ambient noise level, lasting some 20 minutes, would be detectable by belugas that are in a 2-km corridor on either side of the trajectory of LNG tankers during eight months per year, twice every four to eight days.

For fish, the acoustic impact stemming from the close proximity of LNG tankers and tugboats could result in temporarily adopting avoidance behaviour for the water column below the tankers.

- ***Opinion 16 –*** *The Panel is of the opinion that the intermittent underwater noise from the movement of LNG tankers and tugs in the estuary could cause temporary avoidance behaviour by beluga whales and more noise-sensitive marine wildlife that are within a few hundred metres of the route taken by these ships.*

Cumulative effects on fish and marine mammals

Loss and disruption to fish habitat

As all losses of or disruptions to marine fish habitat must be addressed through compensatory measures, the proponent believes that there is no need to deal with the cumulative effects on this component in the environmental impact assessment. However, since this compensation will not necessarily target the habitat affected, the Panel deems that there could be a residual impact on this component. Any residual impact, however small, must be considered as potentially cumulative (PR3.1, p. 6-79; PR2.1, p. 31 and 32; DB41, p. 6).

- ***Recommendation 9 –*** *The Panel recommends that the proponent complete the analysis of cumulative effects on loss of fish habitat related to marine facilities as part of this environmental assessment.*

Navigation

At this time, there is consistent shipping traffic in the study area that comprises all types of ships: ferries, ships for observations at sea, ships involved in the operation of

the Gros-Cacouna port, pleasure crafts, and others. Aircraft tours are also offered in the region of Tadoussac, which also represent a source of noise disturbance for belugas. The number of observation at sea activities has increased substantially since the 1990s. Several aspects could also contribute to the increase in cumulative effects on marine mammals: a possible cabotage project between the north and south shore of the St. Lawrence Estuary; the increase in larger vessel traffic for the Rabaska LNG ports in the region of Lévis and Grande-Anse in the Saguenay; and lastly the increase in large tour boat traffic in the St. Lawrence River, including a terminal project at La Baie in the Saguenay (The St. Lawrence Beluga Recovery Team, 1995, p. 25 and 26; DQ7.1.1, p. 1).

In 1993, a study underscored the fact that marine traffic could represent a source of disturbance, especially for belugas. Changes in their vocal behaviour, which could impair the effectiveness of their communications, were observed when a small boat and a ferry approached them during the course of these studies. Other researchers have speculated that fewer passages by belugas through the mouth of the Saguenay River in recent years could be linked to an increase in navigational activity in this region (Lavigueur, Hammill and Asselin, 1993, p. 34).

The cumulative noise impact of LNG tankers is deemed to be hardly detectable in the main seaway, even though, as noted by Fisheries and Oceans Canada, shipping traffic may at this time result in high noise levels for marine mammals. However, between Les Escoumins and Cacouna, the increase in traffic from LNG tankers is expected to represent an increase of 60% of the current shipping traffic rate in a sector that has relatively little heavy shipping traffic. The proponent plans two routes between Les Escoumins and Cacouna, i.e. north or south of île Rouge. However, there is a high-use area for belugas south of île Rouge, where groups of adults accompanied by young gather between mid-June to mid-September for rearing and feeding activities (Figure 7). Belugas could adopt avoidance behaviour to move away from the disturbance source when LNG tankers and tugboats passed by, for example. The cumulative disruptive effect stemming from shipping traffic on habitats that are considered essential to the survival of belugas, as well as the fact that it would occur during the critical period of their life cycle, could have an impact on the population. Pairs of adults with young are especially at risk, as forced separation occurring over a long period, e.g. during an avoidance strategy, may increase stress or even result in the death of newborns (The St. Lawrence Beluga Recovery Team, 1995, p. 25 and 26).

The lack of scientific data and studies on the impact of marine noise stemming from traffic in general in the Estuary and Gulf of the St. Lawrence prevents the Panel from ascertaining either the presence or absence of cumulative effects from noise linked to LNG tanker traffic on the beluga population in this sector. Therefore, the Panel

strongly encourages Fisheries and Oceans Canada to intensify its research into the effects of shipping on the St. Lawrence beluga.

In short, even though whale-watching activities and marine traffic have generally been acknowledged as disturbances that impact belugas, it is hard to characterize with certainty the magnitude of these disturbances for belugas and the potential consequences on their population distribution, as government authorities have not conducted any studies on this subject. Considering the amount of shipping activity in the estuary, Fisheries and Oceans Canada is concerned by the levels of man-made noise within the scope of the estuary's marine protected area (MPA) project. The Department specified that it plans to set up a multi-party table to discuss the impact of shipping on marine mammals (DA2, p. 28; Mc Carthy, 2004, p. 32 to 37; Richardson, 1995, p. 252 to 274; DA9, p. 1-26 to 1-34; DQ7.1.1, p. 4).

- ***Opinion 17 –*** *The Panel is of the opinion that avoiding disturbance of beluga whales during their most vulnerable period justifies requiring the LNG tankers to use the channel north of île Rouge for transit from Les Escoumins to Cacouna from mid-June to mid-September.*

Terrestrial wildlife habitats

Various effects are linked to the site preparation, construction and operating phases of the LNG terminal. During these periods, wildlife may experience various disturbances attributable to blasting, truck traffic, lighting and noise. In this section, the Panel addresses the project's impacts on a natural environment that is rich in wildlife habitats, where several animal species are protected by government. Specifically, the Gros Cacouna peninsula, in the immediate vicinity of the project, shelters several species or colonies of spectacular birds, including Peregrine Falcon on the cliff, Black-crowned Night Heron living close to the marsh, and Black Guillemot found on the estuary's shore. Several endangered species can be found in the marsh, and a waterfowl gathering area is located in the area of the berthing wharf (Figures 5 and 6).

Peregrine Falcon and the cliff

Blasting the cliff

Even though the current project only requires two tanks, the proponent has planned to create space for three, which would require considerable blasting of the cliff (Figure 5). This blasting, which could be reduced by up to 20% according to the new layout proposed in August of 2006, would include daily blasting sessions spread over 129 days. The peak noise of this intermittent activity is estimated at 158 dBA, and

would result in a noise level of 90 dBA in the marsh, at the foot of the mountain, not far from its access path (PR3.1, table 5.4-5, p. 5-105, DQ40.1).

The proponent did not want to demonstrate the need for this third tank to the Panel within the scope of the project. If blasting were no longer required to prepare the cliff, it would still be necessary to develop the site, although on a lesser scale. The proponent plans to blast during the winter season, from December to March, because of the nuisance factor of this activity, especially during the nesting periods of the birds living in habitats on and close to the site. However, this schedule is subject to receipt of the required authorizations. According to the proponent, delays in the issuance of these authorizations may result in a change in the blasting schedule (Mr. John Van Der Put, DT4, p. 43; DT7, p. 33).

According to Environment Canada and the MRNF, the optimal blasting period would be from October to February. All other periods would impact not only Peregrine Falcon, whose nesting habitat is located on the cliff overlooking the site and which are on site as of March, but also all other birds using habitats nearby, including the colonies of Black Guillemot and Black-crowned Night Heron. According to Environment Canada, the nesting period of migrating birds represents a legal restriction pursuant to the *Migratory Birds Regulations*, and therefore the preferred option remains avoiding this period (DQ8.1, p. 1; DQ13.1, p. 2; DM61, p. 4).

Peregrine Falcon

Falcons nested on the cliff and bred there in 2004, not far from the planned tank site (Figure 5). Some were seen in 2005 and in the spring of 2006. The *anatum* subspecies living in the south of the province of Quebec saw its status improve during the past two decades, changing from “endangered” to “threatened” pursuant to Canada’s *Species at Risk Act* (SARA) and is considered vulnerable according to *An Act respecting threatened or vulnerable species* of Quebec[1]. The action plan to recover this subspecies aims first and foremost to conserve sites on open rock faces and natural cliffs in order to have a population that can independently remain at more than 20 couples and that can breed 37 young falcons every year in Quebec (DQ8.1, p. 1; DM61, p. 1 and 3; DB13, p. 1 and 16).

Even though the cliff holding the nest is not part of the original blasting plans, it could be targeted for safety or aesthetic reasons (DM61, p. 4). Moreover, the proponent expects falcons to avoid the worksite because of the many disturbances, including the noise level. He proposed to install nesting platforms in suitable locations, which would be chosen in collaboration with the appropriate authorities, said collaboration having

1. *Regulation respecting threatened or vulnerable species and their habitats* [E-12.01, r. 0.2.3].

been undertaken. A monitoring program lasting a minimum of three years would be implemented during the operating phase to validate various pieces of information and propose compensation measures if ever nesting losses were recorded. The relative importance of this impact has been deemed by the proponent to be negligible (PR3.1, p. 6-62; Mr. Mario Cantin, DT7, p. 31).

Ornithologists, Environment Canada and the MRNF have questions about how the current site will be used once the terminal is in operation, considering the activities, noise and presence of tanks in front of the cliff. The proponent was of the opinion that, as the impacts are deemed to be negligible, falcons should become habituated to the planned level of activities, in light of their ability to adapt to urban settings. However, tolerance of disturbance is lower for birds that are not already established in urban settings (PR3.1, p. 6-45 and 6-59; DB13, p. 11).

Peregrine falcon pairs return to the same territory to nest, but can use different cliffs or sites from one year to the next. In this respect, the recovery plan for the species stipulates that known nesting territories must be preserved. This is why the mitigation measures and the follow-up program must be consistent with the recovery plan and be coupled with an obligation of result, by request of the MRNF. There are no guarantees that there will be potential nesting sites nearby which would allow the couples to remain on the same territory (Bird *et al*., 1995; DB13, p. 21; Mr. Louis Breton, DT7, p. 32 and 33; DQ45.1; DQ8.1, p. 1; Mr. Mario Cantin, DT7, p. 34).

- ***Recommendation 10 –*** *The Panel recommends that the proponent propose, within this environmental assessment, mitigation and follow-up measures to ensure the longterm use of the Peregrine Falcon nesting areas, in accordance with the Action Plan for Recovery of the Species.*

Seabirds

A waterfowl gathering area that is protected under the *Regulation respecting wildlife habitats* [C-61.1, r. 0.1.5] is located north of the port and the Gros Cacouna peninsula. The guidelines to conserve wildlife habitats stipulate that no net loss of habitat should be authorized. The boundaries of this area have been tabled by the MRNF (Figure 6). It includes the project's jetty and berthing wharf. Several species, including eiders and scoters, sojourn there from spring to autumn to feed and rest. The winter use of this area has not been documented, however (Faune Québec, 2004; DB25; DQ8.1, p. 2; Mr. Guy Verreault, DT4, p. 33).

A colony of Black Guillemot uses the cliff located to the north-east of the project site to breed, and its adjacent marine environment to feed and rest. It is deemed to be the only continental colony west of Mont-Saint-Pierre and is thought to include

approximately 50 pairs. This species is difficult to inventory, and is active mostly during twilight hours (crepuscular species). The nesting habitat starts some 50 m east of the edge of the breakwater rip-rap north of the Port of Gros-Cacouna, and extends approximately 250 m towards the north-east (Figure 5). The species may also use the breakwater. No information is available on the species prior to the previous LNG terminal project of 1981, particularly how it might have been affected by construction of the port. The proposed jetty was in fact moved south-west in order to minimize the impact on the habitat of this species. The location of the tanks and the blasting area were moved as well (DB9; Mr. Yvan Roy, DT7, p. 44; Mr. Louis Breton, DT7, p. 48; Mr. Simon Marcotte, DT7, p. 47; PR8.7, Q-023, Fig. 2 and C-059; DA46, Fig. 1).

The proponent anticipates that the construction could greatly disturb the feeding and resting periods of Black Guillemot. During the operating phase these disturbances, on a smaller scale, would depend on the presence of LNG tankers, once every four to eight days, in accordance with the size of the vessels berthed at some 350 m from the colony. However, the proponent deems the project's impacts to be negligible with respect to the quality and quantity of wildlife habitats, as well as to the abundance and diversity of species in the study area. Other than performing an inventory during the first year of the construction phase, the proponent did not plan any specific long-term follow-up procedure. Environment Canada believes that this species is relatively tolerant to disturbances and did not anticipate major negative effects during the operating phase. Nonetheless, this department asked the proponent to draft a follow-up program, for which it will be available to supply help and advice, and recommended the eventual implementation of additional measures should those proposed prove to be insufficient (PR5.1, QC-074 and QC-142; PR8.3, p. 6-42 and 6-43; DQ1.5, BAPE6.1.3; PR3.1, p. 6-62; DB39, p. 2).

According to the information given to the Panel, the project may have serious impacts on this colony. Intense marine construction activities are slated to occur in front of its habitat, which would be exposed to mean noise levels that are significantly higher than the current ambient noise level, rising from 7 to 22 dBA, from spring 2007 to summer 2009. The terminal's operating noise levels would also remain higher than the current ambient noise level, although to a lesser degree. The rate of disturbance during the operating phase is slated to be once every four to eight days. According to the proponent, the birds and their habitats would only be impacted upon when LNG tankers would pass by their nesting, feeding and resting areas. This effect should be short-lived (15 minutes for the passing of a LNG tanker) to average (up to 3.5 days during stationing activities) (PR8.3, p. 6-42, table 6.3-7).

This information implies that the Black Guillemot colony would be more strongly impacted than other bird colonies which are farther away along the St. Lawrence

Seaway, because of the terminal's presence, as well as the frequency and length of the disturbances.

- ***Opinion 18 –*** *The Panel is of the opinion that despite modifications to the project, the Black Guillemot colony on the Gros Cacouna peninsula could be seriously disturbed by LNG terminal construction and operation activities, and that the habitat could possibly be abandoned.*

Environment Canada lands

Let us refer to the fact that east of the Cacouna port, part of the Gros Cacouna Peninsula, known locally as the mountain, as well as the marsh of Cacouna, are the property of Environment Canada (Figures 3 and 6). This land was transferred from Transport Canada to Environment Canada in 2001, once it became clear that industrial developments in this sector would be impossible after birding activities and their related facilities flourished (Mr. Denis Bastien, DT7, p. 123).

The marsh

The marsh, recognized for its biological diversity, shelters some species which are likely to be designated threatened or vulnerable according to *An Act respecting threatened or vulnerable species* of Quebec, and whose protected status varies for the federal government, i.e. the yellow rail, Nelson's sharp-tailed sparrow, the least bittern and the short-eared owl (PR3.1, p. 6-59 to 6-61).

For the proponent, the amount of dust and noise generated by traffic, machinery and the worksite would be negligible, as these disturbances would be short-lived and their effects reversible, particularly as these habitats have already been disturbed by previous worksites. The habitats of the endangered species are deemed to be sufficiently removed from the worksite to be unaffected. As for the state of observation activities, it would depend on the reaction of the birds and ornithologists to the disturbances, and their perception regarding the quality of their activity. As for the wildlife, the effects are considered negligible and reversible by the proponent (PR3.1, p. 6-62 and 7-68 to 7-72; Mr. Mario Cantin, DT3, p. 20).

Even though Environment Canada is worried that species could be displaced from the habitats adjacent to the worksite, or could even abandon them, and is also worried about the impacts from the noise and traffic on habitats close to the port access route, it does not expect significant impacts on attendance figures for its property, as the main bird watching areas would be located at some distance from the worksite and access roads. In this respect, Environment Canada believes that the west basin should continue to act as a buffer area with respect to the LNG terminal access road,

and that the dyke which separates this basin from the marsh should not, under any circumstance, be developed to provide access to the worksite (DB39, p. 1 and 3; DQ13.1, p. 4).

The proponent placed considerable importance on the Cacouna marsh and committed, with the agreement of Environment Canada, to provide leadership in the financing of improvements to the marsh. These include the development of an interpretation centre and salt water areas, as well as the creation of an education program on nature conservation (Mr. John Van Der Put, DT3, p. 20 and 21).

The Black-crowned Night Heron roost

At the side of the mountain, immediately next to the site's entrance, a roost of Black-crowned Night Heron can be found, a species that is not easily observed. It is a relatively recent addition, following the creation of new environments when dykes were built in the marsh (Figure 5). This site is deemed to be the only known area in the Lower St. Lawrence region having such a high concentration of this species. These herons are said to be sensitive to noise disturbances, especially with the presence of humans close to their habitat. These birds have apparently moved from the marsh's pond towards the west basin in recent years. In addition to blasting part of the cliff to enlarge the site's entrance, the proponent has plans to install the worksite offices at this location, between the cliff and the west basin, and to build the metering station to supply the gas pipeline there. The proponent anticipated that these herons would leave the roost during the work. Information tabled suggests that when a habitat is abandoned, it is not used again for a long time (Ms. Julie Marcoux, DT7, p. 24; DB39, p. 2 and 3; DQ37.1; PR8.7, SQ-001; DQ1.4, BAPE4.8; DA46, Fig. 6; DQ13.1, p. 3).

Environment Canada has asked the proponent to take protective measures: i.e. avoiding activities close to this habitat; implementing, with the help and advice of the Canadian Wildlife Service, a follow-up program that will be tailored to this species; and committing to additional protective measures should the ones proposed be deemed insufficient (DQ13.1, p. 4; DB39, p. 3). The Panel is not convinced, however, that these steps would be sufficient to stop the species from abandoning this habitat.

Regarding noise levels expected at the foot of the mountain, close to this roost, the Panel ascertained that noise levels generated by the construction would be much greater than the current ambient noise level in this location, i.e. by close to 10 dBA during the day and approximately 20 dBA at night, when compared to the mean noise level. An increase of 3 dBA multiplies the intensity of the initial sound source by two. An increase in 10 dBA represents ten times the force of the initial sound source; 20 dBA, 100 times. While there are no existing criteria for wildlife or wildlife-related

activities, the World Health Organization has determined that the ratio of intruding noise levels to natural background sound levels should be kept low in quiet and outdoor conservation areas, without specifying the nature of this ratio[1]. In 2007 activities linked to the delivery and possible future construction of the SkyPower wind turbines would be added to those already present, and the gas pipeline worksite could be an addition to the final construction steps. Disturbances are expected for many species and sound levels could impair the quality of birding activities conducted close to the site, as they use bird songs to identify species. Operating noise levels would be detectable to a lesser degree during the day, but would remain much greater than the marsh's ambient noise level at night (DQ13.1, p. 4).

- *Finding – The Panel found that in the western section of the Cacouna marsh, the level of noise disturbance caused by construction and operation of the proposed LNG terminal could diminish the quality of bird watching.*

- ***Opinion19 –*** *The Panel is of the opinion that the proximity of activities linked to construction and operation of the proposed LNG terminal would disturb the species using habitats around the site, and that the habitat of the Black-crowned Night Heron, located at the foot of the mountain, could possibly be abandoned.*

- ***Recommendation 11 –*** *The Panel recommends that no facilities or activities related to the construction site and operation of the LNG terminal be authorized between the current access road and the Cacouna marsh, near the site entrance. It also recommends that the proponent take measures, such as the construction of a noise-abatement wall during site preparation, to screen the marsh from noise during construction and operation of the LNG terminal.*

- ***Recommendation 12 –*** *The Panel recommends that the blasting of the cliff be limited to removing irregular rocks in order to level the land. This aims to protect avifauna and neighbouring wildlife habitats. In addition, blasting should only be authorized outside of the nesting period, in the timeline specified by Environment Canada and the Ministry of Natural Resources and Wildlife, i.e. from October to February.*

The Gros Cacouna peninsula

The project could result in restrictions in the use of the Gros Cacouna peninsula trails because of impacts on air quality and ambient noise levels during the construction and operating phases. The planned safety exclusion zone around the facilities would encroach upon some 3 ha of Environment Canada land and would bring about use restrictions, i.e. essentially avoiding gatherings of more than 50 people (Figure 3) (PR8.7.1.1, Q2-03; PR3.1, p. 7-68 to 7-72).

1. [Online (July 10, 2006): www.who.int/docstore/peh/noise/Commnoise4.htm]

Environment Canada considers the cliff overlooking the port to be dangerous for hikers and as such is not opposed to these restrictions. However, territory integrity is important for this department, and it would not allow a fence at the limit of the Transport Canada land to encroach upon its territory. Environment Canada plans to install signs along the trails to warn hikers about the LNG terminal's safety exclusion zone, and also to warn them to leave the area immediately should an accident alarm be heard from the terminal (Mr. Louis Breton, DT7, p. 26 and 27).

Cumulative effects on wildlife habitats

The construction and operation of the LNG terminal may be added to existing and planned activities at the Port of Gros-Cacouna and on the Gros Cacouna peninsula, in particular through further degradation of ambient noise levels. This would greatly impact the habitats of many species such as the Peregrine Falcon, the Black Guillemot or the Black-crowned Night Heron, as well as recreational and tourism uses of the adjacent peninsula and marsh. Contrary to the proponent, the Panel views this as a cumulative effect that isn't negligible, but for which it hasn't the capacity to establish short or long-term consequences. Moreover, the planned gas pipeline could also result in cumulative effects, especially during its construction phase.

According to the layout chosen, the planned gas pipeline could interfere with the conservation of wildlife habitats on Environment Canada land. It could be located either alongside the wharf's road or on the west side of the dyke separating the west basin from the marsh, and its impacts could be added to those of the final construction phase of the terminal (Mr. John Van Der Put, DT5, p. 87; PR5.1, QC-056, p. 5; PR8.7, Q-255).

Transport Canada is not in favour of a solution that borders the road because of the restrictions that the gas pipeline would bring about and the constraints it would impose on the development of new areas on its property (Mr. Denis Bastien, DT5, p. 89; DB38, p. 9).

Transport Canada has also proposed a layout in the west basin. However, the gas pipeline could once again represent an obstacle to the port's development as Transport Canada also plans on filling part of the basin to compensate for space lost from port activity development linked to the LNG terminal. Lastly, Transport Canada proposed another layout along the old port access road, which is now the property of Environment Canada (DB38, p. 9 and 10).

Environment Canada is committed to the integrity of its land and the activities that take place on it. It favours the conservation of the wetland bordering the dyke that

separates the marsh from the west basin and would prefer that no actions be taken in this location as it is worried about marshland drying. It is also against actions in the west basin (Mr. Serge Labonté, DT5, p. 90; DB39, p. 3).

- ***Opinion 20 –*** *The Panel is of the opinion that construction of a gas pipeline is a major issue that could result in additional impacts as it will be added to the LNG terminal site, and could represent a threat to maintaining the integrity of the Cacouna marsh.*

- ***Recommendation 13 –*** *The Panel recommends that the proponent submit to Transport Canada and to Environment Canada, as part of this environmental assessment, pipeline route options on Transport Canada harbour property, along with an assessment of the impacts of the pipeline including cumulative effects.*

Chapter 5 Impacts on the human environment

In this chapter, the Panel addresses the impacts of the project on the human environment. The first part deals with noise, followed by air quality and landscape. The Panel also examines the impacts of the project on land use by the Malécites de Viger First Nation and on various tourism activities. It deals with commercial and sport fishing and, with respect to the estuary, the repercussions on navigation and harbour activities as well as access to île Verte. Finally, the economic benefits, municipal services requirements, and effects of the project on the community of Cacouna's social fabric complete the analysis.

Noise environment

The impacts of the project on the ambient noise environment are a major cause of concern that residents have raised since the first information sessions held by the proponent during preparation of the impact study. Site preparation (with blasting), actual construction, and also operation of the terminal would change the ambient noise environment. According to the proponent, the loud noise would be heard during the day when construction work was at a peak. Given that noise generated by the project would be combined with existing noise to create a new sound environment, the Panel reviews this issue from the standpoint of cumulative impacts.

Characterization of the environment and noise impact modeling

Evaluation of the noise environment depends on individual and collective perceptions. Thus, noise from the natural environment, whether it is continuous as with wind through the leaves or waves, or discontinuous as with birds singing, is usually accepted more easily than noise from human activity, such as automobile traffic, industrial activities, or construction. The very nature of sounds makes their characterization difficult. In general the noise level is presented as an average, the noise level equivalent (Leq) over a given period of time (i.e., 1, 12, or 24 hours). It is measured in decibels A (dBA), a scale adapted to the human perception of noise. A change in the sound environment would be perceptible starting at 3 dBA.

The World Health Organization proposes limiting noise in residences to less than 45 dBA to enable communication. It also stipulates that to maintain sleep, noise must be limited to 30 dBA in the bedroom and less than 45 dBA outside the residence at night. Finally, during the day and in the evening, an outside noise level of 55 dBA would correspond to a serious annoyance and 50 dBA, a moderate annoyance[1].

For the operating phase, according to applicable MDDEP criteria for noise sources near rural housing, hour equivalent noise levels (Leq_{1h}) should not exceed 40 dBA at night (7 p.m. to 7 a.m.), and 45 dBA during the day (7 a.m. to 7 p.m.), or the initial ambient noise level, if it exceeds these criteria. During the construction period, the guidelines for community noise specified by this ministry apply. They are 45 dBA (Leq_{1h}) at night and 55 dBA (Leq_{1h}) during the day. Exceptionally, an exemption could be allowed during the day or in the evening (7 p.m. to 10 p.m.), but none would be allowed during the night (DB1; PR6, multiple pages).

Characterization of ambient noise environment

The characterization of the ambient noise environment by the proponent is based on measurements taken continually over a 24-hour period, at five points in the area called receivers (Figure 4). These measurements correspond to the calmest periods of the year, at the end of the fall and during the winter, and particularly during the winter when the ice cover reaches to île Verte.

The equivalent noise levels were then calculated for the day (7 a.m. to 7 p.m.), the evening (7 p.m. to 10 p.m.), and at night (10 p.m. to 7 a.m.), as shown in Table 4. In parallel, sound recordings were taken to identify the sources of the noise. The two quietest places are the marsh (A1) and the point of île Verte known as Bout d'en Haut (A5), characterized by the sounds of nature only, whereas the intersection of highway 132 and the harbour access road (A3) are the noisiest, with the fluctuations around the average noise being more marked than at the other receivers (Ms. Theresa Drew, DT6, p. 76 and 77; PR8.2, Environnement sonore, annexe A).

Project-related sources of noise

Distinct noise sources characterize the different stages of the project. The typical noise levels of the machinery used to prepare the site would vary from 82 to 128 dBA, with a maximum value evaluated to be 158 dBA for blasting at the end of the day. For example, the rock crusher noise level is of the order of 125 dBA. The machinery destined for construction of the terminal, such as barges and cranes, would emit sounds with an intensity varying from 105 to 122 dBA, with a peak value estimated at

1. [On line (July 10, 2006): www.who.int/docstore/peh/noise/bruit.htm]

149 dBA during pile driving (PR3.1, p. 5-100, 102 and 106; PR8.7, Q-071; DA41, p. 2; DA46, p. 12 and 13).

Table 4 Current noise environment at receivers

	Daytime, from 7 a.m. to 7 p.m. (dBA)			Evening, from 7 p.m. to 10 p.m. (dBA)			Night, from 10 p.m. to 7 a.m. (dBA)		
	Least noisy hour	Average	Noisiest hour	Least noisy hour	Average	Noisiest hour	Least noisy hour	Average	Noisiest hour
A1 (marsh near entrance to site)	28.7	38.5	44.6	20.9	37.7	42.4	20.3	22.3	24.1
A2 (cottages on the Gros Cacouna peninsula)	41.7	48.5	53.5	39.8	41.5	42.9	42.5	48.3	52.4
A3 (intersection of highway 132 and port access road)	56.1	59.1	61.1	51.7	52.1	52.4	32.7	52.5	58
A4 (de la Grève Street)	43.3	45.5	53.1	45.6	50.2	53.1	41.1	46.6	50.7
A5 (southwest point of île Verte)	23.7	34.1	39.9	25.1	25.6	26.3	27.2	32.2	37.8

Source: adapted from PR8.2, Environnement sonore, Table 8, p. 17 and Table 9, p. 18.

For modeling, the proponent advanced the hypothesis that the sources of noise would emit at their highest level continuously during the periods of use predicted. The different equipment was associated with permanent sources spread throughout the project site. A typical configuration was modeled for site preparation and another was modeled for construction. The propagation and mitigation of noise as a function of the distance was then modeled. This modeling would yield conservative results, which means that the impacts would in fact be less, except as regards site preparation and construction of marine facilities for which the results are deemed to be realistic (PR3.1, Fig. 5.4-1 and 5.4-3; PR8.7, Q-071).

Noise impacts from construction

The significance of the project impacts was assessed with respect to ambient noise generated by construction and by project operation. To do this, the proponent modeled the average daytime and nighttime sound levels (12-hour periods) and the noisiest hour during each of these periods. These values were compared to the MDDEP criteria, but also to the existing sound levels so as to better estimate the human perception of introduction of industrial type noise in a region in which it is not a basic component.

If the average noise level emitted by the project exceeds the MDDEP criterion, the intensity of the impact is deemed to be high. If it is below this criterion, the sound level of the project's noisiest hour is used and the intensity of the impact is deemed to be negligible, low or moderate depending on whether it is 3 dBA under, less than 3 dBA under or equal to, or greater than, the criterion (PR3.1, p. 5-97).

Concerning perception by the human ear, the intensity of the impact would be high if the average noise of the project were to exceed the average ambient noise. Otherwise, the intensity would be negligible, low or moderate, depending on whether this average noise would be at least 3 dBA less than the least noisy hour of the ambient sound environment, equal to or less than 3 dBA below that level, or above the least noisy hour (*ibid*., p. 5-97 and 5-98).

The proponent also considered the maximum noise levels resulting from blasting and sheet pile driving (impact noises). According to the criteria of the US Department of Housing and Urban Development used by the proponent, these noises would be considered to be normal between 65 and 79 dBA, and their impact would be considered moderate. Above 79 dBA, they would normally be unacceptable and the impact would be deemed to be high. According to the impact study, that would be the case for receivers A1, A2, and A4, whereas the level would be barely below this level for receiver A3 (77.6 dBA). According to modeling done in October 2006, the maximum value would be 75,9 dBA in the village (PR3.1, p. 5-99; DQ1.4, BAPE4.4, DQ40.2, BAPE3-014).

In the impact study, the proponent retained the highest impact intensity resulting from the three assessment methods. Thus, the intensity of sound impacts from the preparation and construction period would be high for cottages and the heart of the village, due to blasting. The construction noise would also be perceptible at certain times of the day and night. It would be moderate for the point A3 because of blasting and because of noise perception during the calm hours of the night. The impact would be moderate at île Verte because of the perception of site noise in an environment in which the initial ambient noise would be rather low.

However, following application of criteria concerning range (local), duration (construction period only), and frequency (once a day for blasting), the proponent reduced the scope of impacts to moderate levels for A2 and A4 and low for A3 and A5 (PR3.1, p. 5-120 to 5-123; Ms. Theresa Drew, DT7, p. 111).

In this regard, it is true that the construction period does not last as long as the operating period. However, the Panel notes that, in its technical notice, Health Canada defined a short duration as being less than two months (DB36, p. 5). Given

that the construction work would last for three years, the Panel thinks that this period can not be considered to be of short duration.

Moreover, the proponent's initial assessment did not take into account the site activities planned at the current Gros-Cacouna harbour facilities (PR8.7, SQ-001). The proponent has since filed several noise impact assessments. The first one, in June 2006, modified several project components, particularly the extension of working hours for site preparation in the evening (16-hour days instead of 12-hour days) and moved the concrete preparation plant towards the project site. The new August 2006 layout proposal includes an update of the assessment of project construction sound impacts. It is now planned for marine facilities to be built 24 hours a day, except for pile driving which would only be done at daytime (DA41; DA46). In October 2006, the proponent revised his noise level predictions indicating that, at least during site preparation, noise levels would increase markedly in the Cacouna village and at île Verte.

The nighttime noise levels are of the same order as those predicted in June 2006. However, the daytime levels are systematically higher, by 5 or 6 dBA in the heart of the village, at the cottages, and in the marsh, and 8 dBA at île Verte. During site preparation, the noise would be clearly perceptible during the day on rue de la Grève since on average it would exceed the ambient sound environment (45.5 dBA) by about 5 dBA. The impacts would thus go from negligible to high in terms of human perception of the noise. During construction, the average levels would be of the same order and slightly above the ambient sound environment (DA41, p. 4). At the intersection of highway 132 and the port access road, the site noise would be clearly perceptible in the middle of the night.

On île Verte, noise during the site preparation period would be audible during calm periods at the quietest times during the day. It would also be perceptible, more significantly, during the construction period. Although the noise would be below the MDDEP criterion, it would be different from the noise that makes up the sound environment on the island and it would be perceived by the residents as a significant deterioration of the sound environment.

At the cottages on the Gros Cacouna peninsula, the ambient noise environment shows fluctuations that seem to follow the tides. The average noise levels of the site preparation and construction periods would be clearly audible during the least noisy phases of this cycle. Health Canada recommends that specific attention be paid to the complaints coming from this sector because of greater expectations for peace and quiet among the residents.

In addition, although the different stages of site preparation and construction were modeled separately, the site organization foresees some overlapping (DQ1.4, BAPE11.5). The noise levels could thus be higher. The noise from construction of the gas pipeline and the noise linked to transportation of material for the SkyPower wind farm project could also be added. What is more, the proponent did not take into account the 5 dBA correction for truck back-up alarms, a signal devised to be clearly distinguishable among a wide range of sound frequencies, nor for secondary blasting that would be done to reduce blocks from primary blasting to acceptable sizes, and for which he was unable to estimate the number of times it would occur. The noise annoyance could thus be higher than the average sound levels might suggest.

The MDDEP criteria apply to the average one-hour equivalent level, Leq_{1h}. However, on rue de la Grève in the heart of the village, the average sound level over a three hour period and the level during the noisiest hour, predicted for the evening, would exceed the criteria during site preparation and construction. It would also exceed the criteria at the intersection of highway 132 for the site preparation period. The MDDEP considers that these average noise levels would be acceptable for the construction period, but that the proponent will have to demonstrate that the limit of 45 dBA will be respected at all times for each one-hour interval during the night (DQ44.1, p. 4). This level corresponds to the World Health Organization criterion outside a residence so as to preserve the quality of sleep. For the Panel, it should include peak noise, because sudden noise is the type that harms the quality of sleep.

In order to limit as much as possible disturbances to housing on the harbour periphery, the Centre de santé et de service sociaux de Rivière-du-Loup considered that the evening and night activities should be prohibited (DM62, p. 4). The Agence de la santé et des services sociaux du Bas-Saint-Laurent is of the opinion that the noise would constitute a major annoyance for the surrounding population and it recommends giving the population a break by limiting marine facility construction work to daytime and the evening (DD14).

To mitigate project impacts on the noise environment, the proponent undertook to limit as much as possible night construction work and especially truck traffic, to carry out blasting and pile driving activities only during the day, and to soundproof the machinery used. A direct access to highway 20 would allow trucks to avoid going through the heart of the village. As an upshot of the results of the new assessment, the proponent could limit evening activities or even propose noise-abatement barriers (PR3.1, p. 5-91; PR5.1, QC-037; Mr. Carl Lussier, DT1, p. 64; DA41, p. 3). Considering that most of the heart of the village overlooks the site, the efficiency of such a measure appears at first sight to be limited.

The noise environment would be reassessed before construction begins and a monitoring program would be proposed, the details of which would be established when the authorization certificate is applied for under Section 22 of the *Environment Quality Act*. The goal of this program is to ensure that the noise levels during the construction period comply with the MDDEP criteria (PR5.1, QC-145R).

- ***Opinion 21 –*** *The Panel is of the opinion that noise emitted during the site preparation period would exceed the ambient noise level in the centre of Cacouna village during the day and will be perceptible in the evening, whereas during construction it will represent a perceptible annoyance for residents living nearest to the harbour in the evening and during the quietest hours of the night. It is also of the opinion that the noise levels during the construction period, though on average below the criterion set by the Ministry of Sustainable Development, Environment and Parks, would contribute to the deterioration of the daytime sound environment on île Verte during calm periods.*

- ***Opinion 22 –*** *The Panel estimates that the annoyance linked to noise impacts of LNG terminal construction could be increased with the addition of the construction site for the gas pipeline and the possible construction of the SkyPower wind farm.*

- ***Recommendation 14 –*** *Since the three year duration of construction work cannot be considered to be short, the Panel recommends that the noisy work be allowed during the day only. Certain work could be allowed in the evening and at night on the condition that the proponent demonstrate to the Ministry of Sustainable Development, Environment and Parks that the noise levels, including peak noise, would be under the Ministry's criterion and that he undertakes to monitor it continuously at night and remedy the situation as required.*

- ***Recommendation 15 –*** *Owing to the proximity of the centre of Cacouna village, the Panel recommends that no major source of noise, such as crushers, be installed for construction purposes on the site now being operated at the Port of Gros-Cacouna.*

- ***Recommendation 16 –*** *The Panel recommends that noise levels from the LNG terminal construction site be monitored continuously at the sensitive receptor sites identified by the proponent and used to characterize the ambient noise environment. If the noise regularly exceeds the criteria set forth in the Ministry of Sustainable Development, Environment and Parks' guidelines, the proponent should take measures to reduce noise emissions.*

Operating phase

The different sources of noise during the operating phase, including the LNG tanker and tugs, would emit between 75 and 110 dBA. The proponent planned to install the noisy equipment, pumps and compressors, inside soundproof buildings. For land

facilities, he used the impact intensity assessment method that is identical to the one used during construction, based on the MDDEP criteria (40 and 45 dBA) and human perception of project noise. The method evaluated operations with and without the presence of an LNG tanker. The noise impacts of these facilities are judged to be negligible at all the receivers, except at the intersection of highway 132 and the harbour access road where they would be low. The noise from the terminal would be perceived throughout the night although they would not reach the MDDEP criterion or exceed the World Health Organization criterion on sleep protection. The noise levels coming from the SkyPower wind mills would be less than 30 dBA in the heart of the village and at the intersection of highway 132 and the harbour road, according to the impact study prepared for the environmental assessment of that project (PR3.1, p. 5-139; Mr. Carl Lussier, DT1, p. 64; Terrawinds Resources Corporation, 2006a, Figure 8.15).

The same exercise was performed for the tugs and LNG tankers en route towards Cacouna. The study area was extended as far as Les Escoumins and the noise impacts of the routes to the north and south of île Rouge were assessed for the municipality and the pilot station at Les Escoumins, île Verte (A5), the rue de la Grève in Cacouna (A4) and the cottages (A2). The values considered are the 12-hour equivalent level and the peak noise, or the sound level during the noisiest minute when a ship is going by. The impacts from LNG tankers going by are judged to be negligible from all standpoints when the tankers take the northern route. They would be low at the pilot station and at île Verte when the tanker takes the southern route. The noise levels obtained, including the one-minute equivalent level, would be under the average levels measured, but equivalent or slightly higher than during the quietest hour. The proponent determined that at a given point the LNG tanker and the tugs would be audible for a period of from ten to fifteen minutes (Ms. Theresa Drew, DT7, p. 92).

Despite the results presented and the proponent's assurance, participants in the public hearing who live in Cacouna or on île Verte were not reassured. Particularly for island residents, their experience of noise does not correspond to the proponent's model. According to them, especially owing to the reverberation of sound waves over the water and the low atmospheric layers, sound carries a long way over water, whereas the maps of sound levels presented in the impact study indicated that sound would attenuate identically over water and over land. The proponent confirmed this point and explained that the sound attenuation factor used (0.3) corresponds to a hard surface and minimum absorption and that he had not differentiated the propensity for thermal inversion above water. In addition, the residents fear that the project noise levels, different from the île Verte sound environment, could be above the ambient noise (DQ25.1, p. 2).

Therefore, the proponent produced an analysis for the operating phase. Under this analysis, a moderate thermal inversion could result in an increase of 4.5 dBA in noise perception at la pointe du Bout d'en Haut. This level would remain under the average night-time noise level but it would be close to the quietest hour of the night. The noise of operations could therefore be distinguished during the particularly quiet periods. It would not be louder than the ambient noise, but it would be different in nature (DA19; DQ25.1, p. 2; Ms. Theresa Drew, DT4, p. 16).

According to a noise impact study for an industrial facility, for conditions analogous to those of the project as regards noise sources and noise levels measured at three receivers located in a 10-km radius, the bad weather conditions linked to a temperature inversion could occasionally produce increases of between 10 and 12 dBA (DM54, Appendix 3).

It should be noted here that if the perception of noise during the construction period is of the same order of magnitude as that during the operating period, the site preparation would produce higher levels. The addition of the thermal inversion effects referred to above would make the noise during this period perceptible during a greater number of hours in the day.

- ***Opinion 23 –*** *The Panel is of the opinion that the operating period of the terminal facilities would not cause noise problems for Cacouna residents.*

- ***Opinion 24 –*** *The Panel is of the opinion that noise from the LNG terminal could modify the ambient noise environment of île Verte during calm periods, yet remain within criteria set by the Ministry of Sustainable Development, Environment and Parks.*

Air quality and health

The contaminants emitted during site preparation and construction and during the operating phase present noticeable differences in concentration, for which the impacts on the environment and health can vary. Given that the atmospheric emissions linked to the project combine with the atmospheric emissions of existing activities and are likely to influence the current air quality, the Panel reviewed this issue from the angle of the cumulative effects.

Ambient air emissions

In order to assess ambient air quality in the project area, the proponent modeled the atmospheric dispersion by establishing a reference area of 25 km^2 and a study area of 75 km^2. The data used for simulation were collected at stations in eastern Quebec

due to the absence of data in the project area. This model was judged to be acceptable by the MDDEP. In the case of a simulation with the atmospheric dispersion model, it is often recommended to use the latest five years during which complete data are available, even if they are not the most recent years. However, the MDDEP can authorize use of a shorter period. The proponent's modeling was done using data from 1995 collected over a rather short period of one year and a half (PR3.1, p. 3-3; PR5.1, QC-187; MDDEP, 2002a). The Panel noted that a shorter series of data can result in greater risk that levels are occasionally exceeded, considering the increased uncertainty as compared to a series of data over five years.

The anticipated atmospheric emissions would comprise particulate matter (PM), volatile organic compounds (VOC), polycyclic aromatic hydrocarbons (PAH), sulphur dioxide (SO_2), and nitrogen oxide and dioxide (NO and NO_2), ammonia (NH_3), and carbon monoxide (CO), with concentrations varying appreciably depending on the project phase.

Initial modeling predicted that standards would be exceeded for 2.5 and 10-micron particulate matter ($PM_{2,5}$ et PM_{10}) and NO_2 during the construction phase. The proponent then modified the project, particularly by supplying compressors from Hydro-Québec's grid instead of using diesel generators, as well as the number and the capacity of submerged vaporizers so as to mitigate or eliminate the anticipated overstepping of standards during construction and operating phases.

During construction and operation, the proponent predicts that the level of particles in suspension will be under the levels that could have an impact on humans. The emissions criteria used are those in Quebec's *Regulation respecting the quality of the atmosphere* [c. Q-2, r. 20]. The proponent indicated that falling dust would also meet the criterion in this regulation, which is 46 kg/ha per year. Therefore, the proponent foresees no problems for vegetation, soil, or animals (PR5.1, QC-068). When the proposed *Regulation respecting purification of the atmosphere,* published in November 2005 by the Government of Quebec, is adopted it could however modify certain criteria.

Ozone is a chemical compound of interest. According to Environment Canada, ozone is responsible among other things for minor to severe respiratory problems. The elderly, children, as well as people with health problems would be more vulnerable to heavy ozone concentrations[1]. Nitrogen oxides (NOx) have impacts that include contribution to the formation of ozone through the chemical reaction between oxides and nitrogen and the VOCs under the effect of the sun's rays.

1. [On line (July 31, 2006): www.ec.gc.ca/cleanair-airpur/Problemes_de_sante-WSC8A1FE65-1_Fr.htm]

The results tend to demonstrate that the ozone concentration could exceed the standard above the St. Lawrence Estuary for a maximum of fifteen hours a year, and that these episodes would only occur when the LNG tanker was at the berthing wharf. The proponent mentioned that the thresholds would not be exceeded above inhabited areas (PR3.2, Appendix VI, p. VI-1; PR5.1, QC-204).

Table 5 presents a summary of predicted concentrations following the modifications presented by the proponent in August 2006, as well as the *Regulation respecting the quality of the atmosphere* [Q-2, r. 20] and the proposed *Regulation respecting purification of the atmosphere* published in the *Gazette officielle du Québec*, but not yet effective. Concentrations predicted during operations are the ones expected for an LNG tanker accompanied by tugs. The PM_{10} and $PM_{2,5}$ are compared to an average concentration standard for a period of 24 hours. Since no standard exists for all the compounds in the VOC family, formaldehyde was used as a control parameter because of its high toxicity. The standard was expressed in average formaldehyde concentration over a 24-hour period, whereas the simulated values represent the sum of all VOCs taken together. The CO and ozone concentrations are expressed for an average of eight hours so as to facilitate comparison with the MDDEP standard. With project construction, the maximum ozone concentration for eight hours would undergo a slight increase, going from 368 to 370 µg/m^3 during operations. The poor quality of the ambient air at times for ozone appears to be concentrated in Rivière-du-Loup (PR3.1, p. 5-70 and 7-25; PR5.1, QC-193).

Table 5 Summary of emissions concentrations at the project site

Contaminant µg/m^3	Site preparation			Construction of facilities			Operation with LNG tanker and tugs	Norme
	Ref.[1]	Prep.[2]	Total	Ref.[1]	Constr.[3]	Total	Total	
SO_2	0.2	46	46.2	0.3	22	22	100	228
NO_2	0.9	24	24.9	1.6	48	50	38	207
PM_{10}	1.8	33	34.8	5.1	46	51	5	50
$PM_{2,.5}$	2.1	17	19.1	2.1	30	32	5	30[4]
COV	46	1.7	47.7	4.6	4	8.6	22	9.6
CO	20	110	130	16	668	684	27	14 888
Ozone	105.2	28.1	114.1	105.2	22.5	112.3	104	128[5]

1. Reference.
2. Preparation.
3. Construction.
4. Standard for the proposed *Regulation respecting purification of the atmosphere*.
5. Pancanadian Standard (Canadian Council of Ministers of the Environment, 2000).

Sources: adapted from PR5.2.1; DQ40.1; BAPE3-003; *Regulation respecting the quality of the atmosphere* and the proposed *Regulation respecting purification of the atmosphere*.

The Panel noted that the reference values vary for SO_2 and NO_2 depending on the stage of the project. It is thus important to be cautious regarding air quality monitoring during all project phases so that standards are not exceeded.

The values expressed in Table 5 represent the total for all types of VOCs. The maximum value of formaldehyde alone for the project would be 9.8 $\mu g/m^3$, and thus exceeds the MDDEP standard. During construction, VOC concentration at the nearest residences would be 26, taking into account all types of VOCs including formaldehyde. Therefore, the values anticipated by the proponent during the construction and operating phases are slightly higher than the reference values, for the sum of all types of VOCs. The proponent thus considers that the VOCs are not a problem. Health Canada mentioned that formaldehyde, a forerunner of ozone, is carcinogenic[1]. However, the proponent's studies indicate that the emission generated during the different project phases are under the existing level as modeled. In addition, with no LNG tankers or tugs present, VOC emissions during the operating phase would be 4.5 $\mu g/m^3$ (PR5.1, QC-201).

Table 6 includes emission rates predicted for NO, NH_3, PAH and greenhouse gases in CO_2eq for LNG tanker terminal site preparation, construction, and operation. These compounds do not have defined standards.

Table 6 Emission rates

Contaminant kg/j	Site preparation	Construction of facilities	Operation with LNG tanker and tugs
	Total	Total	Total
NO	21	545.5	754
NH_3	0.017	0.081	0.0018
PAH	0.004	0.02	0.035
CO_2eq (t/yr)	877	505.8	131 670

Sources: adapted from PR5.2.1; DA3, p. 4; DQ40.3, BAPE3-003.

Construction phase

During construction, emissions would mainly come from vehicle traffic, blasting, demolition of the Ciment Québec inc. silo, the cement preparation plan, and from diesel generators and machinery. The proponent plans measures to reduce

1 *Let's Talk about Health and Air Quality*.
[On line (July 31, 2006): www.hc-sc.gc.ca/ewh-semt/air/out-ext/effe/talk-a_propos_e.html]

emissions, such as use of dust suppressants and low emission machinery, as well as rock crushing on the spot following blasting (PR3.1, p. 2-104).

Terminal site preparation and construction would occasionally result in PM, NOx and COV levels exceeding standards. The maximum PM and NOx concentrations during the site preparation phase would be limited to the site and to the vicinity of the new terminal. Similarly, the maximum concentrations during construction would be limited to the site, except for $PM_{2,5}$ whose maximum concentration would instead be localized south of Rivière-du-Loup. Residents could undergo deteriorated ambient air quality (PR5.2.1, QC2-10; PR5.1, QC-198, Figures QC-198A and QC-198B; PR3.1, p. 7-4).

The proponent mentioned that when the NOx exceeded the standards it would be over the St. Lawrence Estuary. In addition, emissions in general were judged by the proponent to be not persistent and thus would not cause any marked effect on the environment, even though construction would last three years. The proponent concluded that these occasions when standards are exceeded would not cause the population to be exposed to heavy concentrations of NO_2, VOCs and PM, and that the effects on health would thus be negligible. Ozone concentrations over a period of 8 hours would be lower than the standard (PR5.2.1, QC2-10; PR3.1, p. 39; DQ40.1, BAPE3-004).

The Agence de la santé et des services sociaux du Bas-Saint-Laurent nonetheless concluded that the proponent is ignoring the epidemiological results that show that even under the standards, health problems related mainly to the cardio respiratory system can be observed. In addition, the lack of information about the impacts on health do not enable one to conclude whether the peak concentrations would have an impact on the people who already suffer from diseases such as cardiorespiratory disease (DM22, p. 2; Mr. Bernard Pouliot, DT5, p. 55 and 56).

- ***Recommendation 17 –*** *The Panel recommends that atmospheric emissions from construction of the LNG terminal be monitored continuously, so that whenever air quality criteria are exceeded, remedial action can be taken rapidly.*

Operating phase

Terminal operation is likely to generate atmospheric emissions linked mainly to submerged combustion vaporizers, auxiliary generators, LNG tankers, backup generators, and service vehicles. The proponent made modifications to the initially planned vaporizers so as to satisfy the NOx standard in the *Regulation respecting the quality of the atmosphere* and to reduce carbon monoxide emissions (PR3.1, p. 2-115; PR5.1, QC-202).

To limit the impacts on human health, the proponent did not plan to install a flare stack to burn away gases since the emission of pollutants that would be generated to maintain the flare stack would exceed the quantity of gas discharged into the air. Without flare stacks, the NOx emissions in the region would not be increased (PR5.2, QC2-8; PR5.1, QC-182, p. 2).

The troposphere ozone modeling foresees a regional impact, with maximum ozone concentrations localized near cottages on the Gros Cacouna peninsula, and Rivière-du-Loup. Maximum NO_2 concentrations would also be recorded to the southwest of the municipality of Cacouna and at Rivière-du-Loup (PR5.1, QC-198, Figure QC-198C).

The PAH come mainly from vehicle exhaust. LNG tankers and submerged combustion vaporizers also produce some PAH. There is no standard for all of the chemical compounds included in the PAH category. The most carcinogenic, benzo[a]pyrene, was retained as a control value and compared to the MDDEP standard of 0.032 $\mu g/m^3$. According to the proponent, the concentrations expected would lead to the conclusion that the PAH are not problem substances for health in this project (PR3.1, p. 7-27).

Environment Canada expressed some concern about fugitive emissions that could escape during the operating phase, particularly VOCs. The proponent undertook to follow the recommendations of the Canadian Council of Ministers of the Environment as proposed by Environment Canada, but without detailing the measures that would be implemented to ensure the follow-up (PR8.7, R-002).

The proponent does not plan any monitoring of human health. However, it proposes mitigation measures to reduce the impacts on air quality during operations. For the construction zone, the impacts on worker health were judged to be negligible by the proponent based on the applicable professional exposure limits. The proponent specified that it has committed to always respect the applicable standards during the construction and operating period (PR3.1, p. 7-22, 7-28 and 7-29, Section 5.3; DQ40.1, BAPE3-004).

Despite all of this, the Panel found that the probability remains for the population to be exposed to additional atmospheric emissions from LNG tanker terminal operation. The MDDEP defines a risk as acceptable:

> […] on the condition that it does not exceed the risk levels, environmental or other, to which the population is usually exposed in daily life and that this risk is clearly communicated to the population.
> (2002a, p. 8)

During the public hearings, several people expressed concerns about air quality and its impacts on the health of the population. The proponent is of the opinion that the MDDEP standards on atmospheric emissions would be respected. The proponent concluded that the project would not have any effect on health (Mr. Éric Bergeron, DT5, p. 48).

Nonetheless, the Agence de la santé et des services sociaux du Bas-Saint-Laurent qualified this statement and mentioned that the effects observed of chronic exposure to concentrations less than the standards include premature mortality, hospitalization, visits to emergency rooms, increased medication, and respiratory problems. However, there are no regionally based data since the region has no sampling station. It is therefore impossible to monitor ambient air quality on this basis (Mr. Bernard Pouliot, DT5, p. 55).

- *Finding – The Panel found that uncertainties remain as to the effects of the project on the health of the population, and there is a risk that atmospheric emissions standards will be exceeded during LNG terminal operation. However, the proponent does not plan any follow-up of ambient air quality during operation.*

- ***Recommendation 18 –*** *The Panel recommends that the proponent build and operate a sampling station to monitor the main compounds that could exceed standards during operations (ozone, NO2, particulate matter), as well as fugitive emissions. This station should be installed when work begins.*

Integration of project in the landscape

> Sometimes I hear loud voices from the past,
> And see again my villaed infancy;
> I find once more all things that belonged to me
> When through the blinds evening's light was cast.
> Ruins, poem by Émile Nelligan, Translated by Fred Cogswell, *The Complete Poems of Émile Nelligan,* Harvest House Press, 1983

Émile Nelligan spent several summers during his childhood and teens in Cacouna, a renowned vacation spot. Cacouna's citizens are obviously proud that their village had attracted and inspired this great Quebec poet, and they are still just as proud when they talk about the charm of the human environment and the landscape that, each year, still attracts many visitors.

The visual quality of the environment

The richness of Cacouna's tourist and heritage attractions was recognized in 2000 by the Association of the Most Beautiful Villages of Quebec. This association is a network of village communities with an authentic heritage that are located in outstanding scenic surroundings. To be eligible for inclusion in this network, the village has to meet criteria concerning the quality of the place as regards scenery, architecture, and town planning. What is more, as a member of the association, the village of Cacouna must subscribe to the Charter of Quality of the Most Beautiful Villages of Quebec and must undertake to respect certain principles in order to maintain the authenticity of the village landscape[1].

The municipality of Notre-Dame-des-Sept-Douleurs recently launched an initiative to preserve the island landscape on île Verte. It presented its candidacy to the MDDEP to designate the island as a "cultural landscape" which is a protected area under the *Natural Heritage Conservation Act* [2] (R.S.Q., c. C-61.01). This law specifies that the types of activities that are allowed or prohibited are determined by a cultural landscape protection agreement reached between the municipality and the minister. The duration of this agreement cannot be less than 25 years (Méthé et Newbury, 2004).

The MRC of Rivière-du-Loup had the landscapes in its territory characterized and assessed. The study conducted by an expert firm showed that a very high quality landscape area is located northwest of the MRC, namely all the shoreline sector between the Gros Cacouna peninsula and the eastern part of the Îsle-Verte municipality. The section of highway 132 running through this sector is also considered to be remarkable with exceptional aesthetic value. The study specified that the shoreline of the estuary deserves particular attention so as to maintain and even improve the landscape quality. The study concluded by underscoring the fact that the landscape represents a significant economic value in terms of tourism and, for this reason, it warns the MRC against any development project that could have an impact on the landscape in these sectors (Ruralys, 2006, p. 53).

The MRC of Rivière-du-Loup recognizes the importance of the aesthetic value of its territory for the development of tourism and maintenance of the population's quality of life. In this regard, it adopted an orientation aimed at preserving and developing the most significant and most remarkable visual perspectives and natural and cultural landscapes. This was done so as to favour and reinforce the population's feeling of

1. [On line (July 31, 2006): www.beauxvillages.qc.ca/anglais/villages_a/cacouna_a.html]
2. Under this act, a cultural lanscape is an area constituted for the purpose of protecting the biodiversity of an inhabited territory, land or aquatic, whose landscape and natural components have been shaped over the years by human activities in harmony with nature and presents remarkable intrinsic qualities whose conservations depends heavily on the pursuit of acivities that are at the origin of the area.

belonging and pride in their living environment but also to support the tourism industry. In addition, as a development strategy, the MRC intends to pay special attention to the integration of all telecommunications and energy production and transmission projects. It therefore designated sites of aesthetic interest[1] on the territory, and the Gros Cacouna peninsula is on the list of eleven sites retained. It is also the case for a portion of highway 132 that goes through the heart of the village with a high cultural value (DB6.2, p. 11-6 and 11-13).

- *Finding – The Panel found that the municipalities of Cacouna and Notre-Dame-des-Sept-Douleurs have high heritage and landscape values. On this point, the MRC of Rivière-du-Loup particularly noted the esthetic value of the Gros Cacouna peninsula and the highway 132 corridor that goes through the heritage section of the Municipality of Cacouna.*

- *Finding – The Panel found that the Municipality of Notre-Dame-des-Sept-Douleurs launched an initiative with the Ministry of Sustainable Development, Environment and Parks to have île Verte given a protected status as a "cultural landscape" under the "*Loi sur la conservation du patrimoine naturel*".*

Effects of project on the visual quality of the environment

Project components

During construction of the LNG terminal, which should last about three years, site development and the traffic of a large number of trucks will be the main elements that affect the landscape according to the proponent. However, the main impacts on the landscape would occur during operation of the terminal and would last for about forty years. Thus, two LNG storage tanks 79 m in diameter and 50 m high would be visible. There would also be the many large dimension industrial buildings varying between 4 m and 12 m high, the two 22-m high stacks for the submerged combustion vaporizers, the electricity towers about 30 m high and the two 27-m distillation columns. Finally, a jetty approximately 350 m long and a berthing wharf 450 m long with unloading arms and vent stack 30 m high would also be visible in the landscape (PR3.1, p. 7-93).

The imposing size of the LNG tankers would also represent a significant element in the landscape. According to the proponent, an LNG tanker with a capacity of 145,000 m^3 could be 285 m long and 45 m wide. With a height of 55 m, the size of an LNG tanker could be compared to an 18-storey apartment building. The presence of such massive ships, every four to eight days, would not go unnoticed in the

1. A site of aesthetic interest corresponds to a place surrounding a natural attraction at the time whose landscape is unique, scenic, and original, or to a specific place that enables one to have a remarkable view (DB6.1, p. 11-7).

landscape. In addition to all these facilities, the proponent added that the visual elements of the site would also be affected by the blasting of the rock wall, the removal of vegetation around the project, and by the plume of atmospheric emissions (PR3.1 p. 7-93; DQ35.1, p. 2).

Furthermore, during the construction and operating period, the facilities would be illuminated. During construction, the new sources of light would come from the machinery and the security areas, while during operations, the various buildings, the jetty, the unloading facilities, and the LNG tankers berthed would be lit up. For security reasons the proponent would also have to ensure adequate lighting at strategic spots on the site, particularly along the fence used to mark the boundary of his property. Under standard CSA-Z276-01 regarding LNG production, storage, and handling, the facilities must indeed be well lit around the fences and everywhere else where necessary for security (Canadian Standards Association, 2003, p. 56).

- *Finding – The Panel found that the large size of the terminal facilities and the LNG tankers would mark the Cacouna landscape.*

Impacts of the project on visual resources

In order to assess the impacts on the landscape, the proponent used “key viewing points” representative of views towards the facilities. It concluded that the project would be visible from several places: from the centre of the village of Cacouna, from the cottages along the shore, from the marsh and the trails on the Gros Cacouna peninsula, from île Verte as well as by pleasure boaters traveling in the St. Lawrence Estuary (PR3.1 p. 7-94; PR8.2, Ressources visuelles, p. 22).

The ambient light of the landscape around Cacouna could also be modified with the coming of the LNG tanker terminal. According to the proponent, at present there is no source of light at the place planned for the terminal, except when the Ciment Québec inc. silo lights are on. On the other hand, the adjacent Transport Canada port facilities have at least twenty light sources visible from the surrounding areas, and particularly from the heart of the village of Cacouna. The proponent admits that the light intensity visible from the municipality of Cacouna, from the marsh, and from the Gros Cacouna peninsula would increase during the LNG terminal construction and operating period. The people from the municipality of Notre-Dame-des-Sept-Douleurs and Cacouna, the users of the marsh and the Gros Cacouna peninsula would see the light environment modified (PR3.1, p. 7-102 to 7-108; PR8.2, Ressources visuelles, p. 12).

Mitigation measures

As mitigation measures, the proponent proposes facility maintenance, landscaping with a visual screen, the appropriate colour used for buildings which would be painted so as to integrate them in the landscape, and removal of the Ciment Québec inc. silo. In order to attenuate site luminosity, he suggested directing lighting downwards and towards the facilities. Therefore, when there are no LNG tankers at the wharf, the light intensity of lamps would be reduced to a minimum for security measures, or about 100 lux[1] at 1 m from the light source. The proponent did not indicate what the light intensity would be when an LNG tanker was being unloaded. They nonetheless specified that during operations, the number of lamps, estimated to be 68, that would have to provide light with an intensity of 150 lux and more, would be limited (Mr. Jorgito Tseng, DT5, p. 11; PR8.2, Impacts sur le milieu humain, p. 7-105).

In order to have an idea of the light intensity produced by 100 lux, the Panel retained the minimum levels of lighting required by the *Regulation respecting health and safety at work* [S-2.1, r. 19.01] for the work site. For example, on a work site that does not require a high level of perception, such as a conference room or a large equipment moulding plant, the minimum level of lighting at one meter above ground must be 250 lux. A place with a moderate perception level such as for office work, requires lighting of 550 lux and precision work similar to sewing by hand, for instance, requires a minimum of 800 lux. It goes without saying that the light intensity diminishes as one moves away from the light source.

Residual impacts

Project impacts on landscape quality and the points of visual interest would be significant for certain residents and visitors on the medium term, but are not considered to be significant by the proponent (PR3.1, p. 7-101). He concluded that the changes to the landscape would not likely cause a disturbance to the people's lives that would be unacceptable. The proponent indicated that landscape architects are usually not involved in LNG tanker terminal projects, since the design of the structures and facilities is based on Canadian engineering standards instead (DQ1.3.1, BAPE15.4).

The Panel considers that the proponent underestimated the value of the visual resources in its impact study, since most of the village centre would have a permanent view of the LNG terminal. For example, the port facilities are now very visible from the rue de la Grève where several people live, as well as from the house

1. Lux: A unit of illumination, equal to the illumination on a surface of 1 m^2 in area on which there is a luminous flux of 1 lumen uniformly dustributed.

of the Malécite de Viger First Nation and from highway 132 that is used by tourists (Figure 4). To illustrate, the Ciment Québec inc. silo, visible in photos 1 and 2, is equivalent in height to the planned LNG storage tanks.

Furthermore, the Panel considers that the mitigation measures proposed by the proponent are inadequate. On one hand, the demolition of the Ciment Québec inc. silo cannot be considered as a mitigation measure since it is necessary for the construction of the LNG tanker terminal. On the other hand, the land facility development plan is too brief and its quality is far from being conclusive (DA6). Finally, concerning the idea of painting the LNG storage tanks a colour that would match the landscape, the proponent did not yet demonstrate that he would achieve the desired result. A real landscape development plan and an architectural plan minimizing the visual impact of the two storage tanks would be important in order to integrate such imposing facilities in a sector recognized as being remarkable from the standpoint of landscape and heritage.

- ***Opinion 25 –*** *The Panel is of the opinion that, despite the industrial orientation of the site proposed for construction of the LNG terminal, the size of the infrastructure and the LNG tankers, as well as the various safety and security measures such as the fence and lighting, would significantly modify the landscape for residents of the village of Cacouna and for visitors.*

- ***Recommendation 19 –*** *The Panel recommends that the proponent, in collaboration with the municipal authorities and associations working in the area of heritage protection, review the visual integration of the project in an effort to make it blend into its surroundings.*

Cumulative effects

Construction of Gros-Cacouna harbour has changed Cacouna's surrounding landscape. Today, the area's scenery is characterized by the port facilities and related activities. The scenery could change yet again for residents of Gros-Cacouna and Notre-Dame-des-Sept-Douleurs, especially for those living in la pointe du Bout d'en Haut, both because of the Cacouna Energy LNG terminal and the development of a wind farm by SkyPower. Skypower plans to build 122-m high windmills in the MRC of Rivière-du-Loup, some of which would have flashing 1,500-lux red lights installed on the gondola. Up to now, the project proponent has been unable to evaluate the cumulative effects of the LNG terminal and the windmills on the landscape. This is because both the number and location of windmills planned for Cacouna have not yet been determined (DD10; DD11). It is worth noting that the project is undergoing major revision, and that the windmills could be built at a greater distance from Cacouna's village centre.

Photo 1 View from de la Grève Street looking towards the proposed site.

Photo 2 View from the Administration Centre of the Malécite de Viger First Nation looking towards the proposed site.

Source: DM59, appendices 7 and 8.

The Règlement de contrôle intérimaire de la MRC de Rivière-du-Loup (the interim oversight regulations of the MRC of Rivière-du-Loup) might require that windmills only be put up south of highway 20 (DB1, *Projet d'aménagement d'un parc éolien dans la MRC de Rivière-du-Loup*).

Moreover, the project proponent did not take the visual impact of the future gas pipeline's metering station into account. It would be visible to residents of the surrounding streets and to motorists on highway 132[1]. Again, on this point, the Panel feels that a full development plan for landscape should make provision for concealment of facilities that is acceptable to protect the landscape.

- ***Recommendation 20 –*** *The Panel recommends that the gas pipeline metering station be taken into account in the LNG terminal architectural integration plan.*

The value of the landscape

According to one participant at the public hearings, the concept of cultural landscape must be expanded to encompass both the natural and cultural elements of a place: "It is a symbiosis between nature and culture […] the idea is to allow people the use of a place while recognizing that a locale expresses the attitudes and values of the past" (Mr. Pierre Larochelle, DT8, p. 33).

According to a document from the ministère des Affaires municipales et des Régions (Quebec ministry of Municipal Affairs and Regions), none of the available tools of town planning is intended to protect the surrounding landscape. Landscape is never mentioned in the *Loi sur l'aménagement et l'urbanisme* (An Act Respecting Land Use Planning and Development) (L.R.Q., c. A-19.1) and, as for the *Loi sur les biens culturels* (Cultural Property Act) (L.R.Q., c. B-4), it confines protecting landscape to the concept of heritage. There is, of course the *Loi sur la conservation du patrimoine naturel* (Natural Heritage Conservation Act) which mentions the concept of protecting landscape, but only in the specific context of "protected areas" (Boucher, 2005). Nevertheless, one of the sixteen principles of sustainable development applied by the Government of Quebec is explicit as far as protecting landscape is concerned and includes protection of cultural heritage. It is defined as follows:

> The cultural heritage, made up of property, sites, landscapes, traditions and knowledge, reflects the identity of a society. It passes on the values of a society from generation to generation, and the preservation of this heritage fosters the

1. As it comes out of the vaporizers, the natural gas is moved towards a commercial metering station so that the volume and composiiton of the gas can be measured before it is put in the transportation network. [On line (August 16,2006): www.rabaska.net/page.php?idS=2&idL=en]

> sustainability of development. Cultural heritage components must be identified, protected and enhanced, taking their intrinsic rarity and fragility into account.

No law or regulation requires the LNG terminal's proponent, or any other proponent, to protect Cacouna's heritage landscape, despite the fact that it is recognized by those in municipal government and tourism. On this issue, the Panel has noted the MRC's vision. While the regional government recognizes the aesthetic value of the Gros Cacouna peninsula, the heritage corridor within the village area of Cacouna, and that the proposed facilities are not attractive, it has not required that the proponent mitigate the project's effects on landscape through appropriate measures (DM45, p. 17).

Along with a number of participants at the public hearings, the Panel takes the view that the local landscape has undeniable value for culture and tourism, constituting a collective asset that must be protected.

- ***Opinion 26 –*** *The Panel is of the opinion that the MRC of Rivière-du-Loup and the Municipality of Cacouna could require the proponent to take effective measures to mitigate the visual impact of the LNG terminal. Considering the safety and security related constraints of the LNG terminal, the proponent could submit to municipal authorities an architectural plan for the proposed facilities, as well as a detailed landscape plan.*

Land use by the Malécites

Malécites history began well before Europeans came to North America. The "Guardians of the Portages", or the Etchemins as the Europeans called them, formed a people, which while nomadic, inhabited the South shore of the St. Lawrence River for centuries. This First Nation, which made its living from hunting and crafts, was granted a tiny reserve of 0.2 ha by the Government of Canada in 1891. Located about 1 km west of the Port of Gros-Cacouna, today it may be the smallest First Nation reserve in Canada. Its last resident died in 1972; then, in 1996, an administrative centre was built on the reserve. It was not until 1987 that the first band council was formed, bringing official recognition to Quebec's 11th Aboriginal Nation.

Aside from Cacouna, the Malécites de Viger First Nation has a second reserve located at Withworth in the Lower St. Lawrence, 30 km south of Cacouna and it currently may be inhabited by two people. Several Malécites live in the area near Cacouna Reserve and in the surrounding municipalities. But it would appear from

their own historical accounts that most of the First Nation, with approximately 759 members, lives throughout Canada and the United States[1] (DQ5-1, p. 2; DQ4.1, p. 1).

According to them, the Malécites ancestral lands extend from the Bay of Fundy to the Lévis area. The Government of Canada has begun negotiations with the Malécites de Viger First Nation that focus mainly on ancestral rights or treaty rights that the Malécites say that hold. Although the Government of Quebec took part in preliminary talks as an observer, it, nevertheless, sustains that Malécites claims are not supported by factors that justify its involvement in a wide-ranging process of land claims. Transport Canada, on its part, recognizes that the portion of Gros-Cacouna lands that would be the object of a lease to be signed with the proponent is within territory that is the subject of claims by the Malécite First Nation. On this point, Transport Canada intends "to respect Her Majesty's federal obligations, if applicable, and to preserve the Honour of the Crown" (Ms. Martine Bruneau, DM48; DQ4.1, p. 1; DQ5-1, p. 2; DQ6.1, p. 4).

Impacts of the project on the Malécite nation

The proponent took steps to get the Malécites First Nation's views on the LNG terminal project:

> Since September 2004, Cacouna Energy met several times with the Malécites de Viger First Nation [MVFN] to open a dialogue and to understand the MVFN's concerns and expectations […] Nevertheless, due to political and administrative difficulties within the MVFN, its leaders could not agree on whether or not to participate in this process […] Given this situation, Cacouna Energy was unable to consult with the MVFN about the procedures to follow to assess environmental impacts and to share information gathering. Consequently, the basic information contained in the impact study, in respect to the MVFN, is limited to publicly available information.
> (PR3.1, p. 7-46 and 7-47)

On the basis of publicly available information, the proponent still has not discussed the potential impacts on the Malécite First Nation in the impact study. The Malécite First Nation, however, provided the Panel with additional information during the public hearings, mainly about a tourism plan and a plan to have its members return to the area. Finally, the Panel noted that Transport Canada undertook discussions with the Malécite First Nation to get its views about the project's anticipated impacts on its activities (Ms. Martine Bruneau, DM48; Mr. Jean Genest, DM85; DQ6.1, p. 3).

1. *Indian and Inuit Populations in Quebec as of December 31, 2004.*
[On line (August 3, 2006): www.ainc-inac.gc.ca/qc/aqc/pop_e.html]

- *Finding – The Panel found that, at the time of the hearings, the actions taken by the proponent did not enable him to identify the concerns of the members of the Malécite de Viger First Nation in relation to the LNG terminal project, and that Transport Canada has instigated consultations to this end.*

Traditional activities

Hunting, trapping and fishing are the traditional lifestyles followed by members of the Malécite First Nation. The right to pursue these activities could be issues raised in discussions preceding land claims negotiations with different levels of government. In the meantime, sectoral agreements have been concluded between the Government of Quebec and the Malécite First Nation to allow some hunting, fishing, and trapping in certain agreed areas that extend from La Pocatière and Mont-Joli to the province's southern limits. Still, the planned site of the future LNG terminal only affects port properties on which Transport Canada never agreed to terms under which Malécites activities would be allowed, nor was informed that such activities could be taking place (DQ4.1, p. 2; DQ6.1, p. 4).

In 2001, an agreement was signed between Fisheries and Oceans Canada and the Malécite First Nation to allow use of fishery resources for subsistence fishing. Consequently, on the basis of the agreement, fishing permits were issued to the Malécites for shrimp, snow crab, herring, mackerel, and groundfish. However, the fishing areas were not specified (DQ21.1, p. 2).

- *Finding – The Panel found that there do not appear to be any hunting, fishing, and trapping activities carried out by members of the Malécite de Viger First Nation on Transport Canada land.*

Economic development

The Malécite First Nation Band Council is active at Cacouna in the economy and tourism. It uses the Maison Launière to sell crafts; it has a traditional site in front of the administrative offices. It has acquired an inn on highway 132 and cottages on Cacouna Point. The Malécite First Nation also offers nature interpretation activities in the Cacouna Marsh. It should be noted, however, that Malécites activities have been reduced since a conflict over governance started in February 2004 (DQ1.4, BAPE-7.2; DQ4.1, p. 2).

The Malécite de Viger First Nation seeks to end economic dependence on government. The band council planned a recreotouristic project that will require an investment of nearly $24 million to ensure the community's viable economic development. It would be located on the lands adjacent to the present Indian reserve

and on Gros Cacouna peninsula. This plan calls for enlarging the Cacouna Indian Reserve and acquisition of property may already be underway (Ms. Martine Bruneau, DM48; Mr. Jean Genest, DM85; DQ1.4, BAPE-7.2).

A representative of the band council describes the plan as follows:

> This ecological and recreotourism project is based on three major themes: culture, the sea, and vacation rentals. […] Among other things, the St. Georges part of the plan proposes construction of an amphitheatre, a pretty inn, cabins and villas, a garden, an amusement park, and trails. The portion covering the Gros Cacouna peninsula requires access to the sea for excursions, a parking lot, nature reserves with walkways on piles, villas on the sea shore, and trails (Ms. Martine Bruneau, DM48)

This scheme would be an incentive for members of the Malécite de Viger First Nation to return and settle in new localities in the region. Finally, certain members of the Malécite de Viger First Nation spoke out against the LNG terminal project because they think that the two plans cannot coexist harmoniously (Ms. Martine Bruneau, DM48; Mr. Jean Genest, DM85).

- ***Opinion 27 –*** *The Panel acknowledges that the LNG terminal project could have an impact on the Malécite de Viger First Nation's tourism project, and particularly on the quality of the experience of visitors who usually come to this type of site for its tranquility and healing capacity.*

Archaeological heritage

The presence of rock paintings in a cave on these lands was brought to Environment Canada's attention recently. Archaeologists, mandated by the Department, visited the site to determine the authenticity of the paintings and to date them. Their report should be available in November 2006. In the meantime, to protect the cave, Environment Canada has installed a gate at the site and appropriate signage (DQ15.1, p. 5; DQ47.1).

The cave is located on the north shore of the Gros Cacouna peninsula about 350 m east of the project. In regard to concerns that the waves from passing LNG tankers could damage the paintings, the Panel makes the point that that side of the peninsula is regularly struck by winds and storms that can raise strong waves. The waves from tankers' wakes probably are not as high as those resulting from storms (DQ1.5, BAPE-2.8; PR8-3, p. 5-43 and 5-44; DA8, p. 19 to 21).

Archaeologists are concerned about the effects of blasting on the paintings' integrity. Port construction has already resulted in significant construction blasting on part of the peninsula, but no information is available on its possible effects on the rock

paintings. Beyond saying that the intensity of blasting will be moderate, and that there would be a significant distance between blasting and the cave, the proponent has been unable to confirm or deny whether blasting could damage the cave and the rock paintings (DQ1.5, BAPE-2.8; DQ13.1, p. 5; PR8.7, Q2-04).

- ***Opinion 28 –*** *The Panel is of the opinion that the movement of LNG tankers would not have any impact on the integrity of the rock paintings in a cave located on the Gros Cacouna peninsula.*

- ***Recommendation 21 –*** *Should Environment Canada establish the authenticity of the rock paintings in the cave located on the Gros Cacouna peninsula, the Panel recommends that Environment Canada supervise the blasting activities carried out by the proponent.*

Commercial and sport fishing

Commercial fishing

Although the projected course for the LNG tankers in the St. Lawrence Estuary crosses many areas where there is significant commercial fishing, such activity in the Cacouna area, where the species sought are less abundant and where few fishing permits are issued, would be reduced. According to information collected by the proponent, groundfish resources for commercial fishing in the areas being studied mainly serve to maintain family activities and to earn supplementary income for a few families who kept their commercial fishing licenses. This involves fishing for shad, eel, herring, capelin, Atlantic sturgeon, and Atlantic rainbow smelt (PR8.2, Socioéconomique, p. 85; PR5.2.1, QC-38).

There could be two spots in the Cacouna area where fishing for American eel actually takes place, which are located south of Gros-Cacouna harbour at about 2 and 3 km respectively from the harbour entrance. Atlantic herring may be the main pelagic species[1] fished commercially in the Upper Estuary. Spring and autumn are the fishing seasons. The fish generally are taken using gillnets close to shore and purse seines in deep water. Nevertheless, the exact locations where herring is caught in the Cacouna area are not known. Sea urchins are harvested in Gros-Cacouna harbour, or near its entrance, by one person. During the past two years, however, there has been very little activity. The Atlantic sturgeon fishery is concentrated between Montmagny and Saint-Roch-des-Aulnaies, outside the area being studied. Finally, the anadromous rainbow smelt fishery, which used to be important, has declined

1. Which lives in the ocean.

considerably since the mid 1970s. Since 1977, commercial fishing of this species using gillnets or seine nets, has been forbidden due to concerns about the population of this species south of the estuary (PR8.2, Socioéconomique, p. 86 and 87; PR5.2.1, QC-38; DB40, p. 4).

The ministère de l'Agriculture, des Pêcheries et de l'Alimentation (Quebec ministry of Agriculture, Fisheries, and Food) is concerned, nevertheless, about the impact of the LNG terminal on the quality of the fish habitat and on the presence and numbers of the aquatic organisms found in it. According to the Department, the potential reduction of fish stock and commercially viable fish populations, or on the prey species on which they feed, could have an impact on commercial and sport fishing (DB40, p. 1–6). This aspect of the issue was analysed by the Panel in the section dealing with fish and fish habitat.

The proponent does not anticipate any impact on the number, movements, or dispersion of Atlantic herring, Atlantic sturgeon, or Atlantic rainbow smelt in the Cacouna area. Although the exact areas for commercial fishing of these species are not known, the proponent assumes that fishing could take place in other areas, once the safety perimeter of about 2 ha around the berthing wharf is in effect. By the same token, the proponent anticipates no impact on the number, movements or dispersal of green sea urchins or eel near Gros-Cacouna harbour. Moreover, fishing areas for these species are not within the project safety perimeter (PR3.1, p. 7-16).

- ***Opinion 29 –*** *The Panel is of the opinion that the presence of the project's marine facilities and the security zone around them would only have a limited impact on commercial fishing in the Cacouna area.*

Sport fishing

The most popular form of sport fishing in the Cacouna area is for Atlantic rainbow smelt and is done off docks, especially the one in Gros-Cacouna harbour, and on the ice. While fishing smelt in the summer has become less popular since the 1990s, winter fishing has enjoyed growing popularity over the past seven or eight years (PR8.2, Socioéconomique, p. 83 and 85).

The feared impact on sport fishing mainly would be loss of access to sites currently in use. Although access to Gros-Cacouna harbour is closed to private vehicles, smelt, plaice and herring are still caught off the harbour's dock and the seawall. The project would mean loss of access within the safety perimeter. Finally, given the route to be followed by LNG tankers, the proponent does not foresee any effect on ice thickness in the strait between île Verte and the south shore of the St. Lawrence Estuary. Consequently, the proponent does not expect any impact on ice fishing in the île

Verte strait, something with which the Panel agreed in its analysis of coastal processes in the preceding chapter.

Marine navigation

Participants in the public hearings were concerned about the increase in traffic, safety, and future constraints on use of the Seaway by other ships in proximity to LNG tankers, and interference with the marine and St. Lawrence River transportation policies of the Government of Quebec, which, among other things, supports marine cabotage, as well as development opportunities for the Port of Gros-Cacouna.

Marine transportation

The St. Lawrence Seaway is a gateway for cargo traffic destined for the heart of the North American continent. Management of navigation comes under such organizations as the Canadian Coast Guard and the Vessel Traffic Marine Services that oversee ship movements, including local transportation and ferries. In 2003, more than 12,000 ship movements, including Canadian traffic, were counted in the estuary between Sept-Îles and Les Escoumins, a bit more than 6,000 west of Les Escoumins, and 226 at Cacouna, of which 60 were foreign vessels. The proponent plans on using LNG tankers with capacities of 145,000 to 165,000 m³. The capacity of tankers now in use may be lower. Even if the facilities are designed for LNG tankers with a 216,000 m³ capacity, between 65 and 90 tankers should be expected annually. Consequently, the project would add between one and two ships (two and four movements a week) to the situation overall. That represents about 1% of the traffic in the Seaway and an increase of about 60% in traffic in the project area between Les Escoumins and Gros-Cacouna harbour. Given the small volume, the proponent considers that the impact on port activities will be negligible (PR8.3, p. 2-14 to 2-30, 4-4 and 4-5; DA9, p. 1-19 to 1-34).

TERMPOL review process

The effect of the increase in traffic on current navigation will be examined within the framework of the TERMPOL review process, which conducts a technical examination of marine terminals and transhipment sites. The review process comes under Transport Canada's Marine Safety Directorate. A committee of representatives from a number of departments and agencies assesses the safety of ship routes and operations, as well as matters of management and respect for the environment related to the location, construction, and use of a marine terminal for transhipment of goods that present risks to public safety and the environment. The committee's report

will be made public after review by the participating departments and agencies and approval by the Director General of Marine Safety at Transport Canada. It is expected to be available for the autumn of 2006 (Mr. Michel Boulianne, DT2, p. 11; DT6, p. 14 and 18). Within the framework of its mandate, the Panel obtained from the proponent and Transport Canada the information that it considered relevant to the examination of the project.

In the gulf and estuary, as far as the Escoumins Station, where pilots become involved, inbound and outbound traffic is separated. According to Transport Canada, respect for the rules and usual traffic lanes should be sufficient to maintain reasonable distances between ships so that additional safety restrictions do not have to be imposed on LNG tankers. On this point, the Department does not currently have special safety requirements for the route between Les Escousmins and Gros-Cacouna harbour (DB38, p. 5; DQ31.1, p. 1 and 4; Mr. Michel Boulianne, DT7, p. 8).

- *Finding – The Panel found that it is Transport Canada's responsibility to ensure marine transport security, and that this department, as part of the project, is conducting a specific review of the LNG tankers, the "Technical Review Process of Marine Terminal Systems and Transshipment Sites", and the report will only be made public in the autumn of 2006.*

- *Finding – The Panel found that the increased marine traffic generated by the LNG terminal would not cause additional constraints to navigation.*

Project impacts on the Port of Gros-Cacouna

As far as activities at the Port of Gros-Cacouna are concerned, it seems that a study of cohabitation has demonstrated that the LNG terminal would not hinder current activities, nor the development of additional ones, including, among others, cabotage, a priority for the Government of Quebec's Maritime and St. Lawrence River Transportation Policy that seeks expanded use of the St. Lawrence River as a transportation and trade route[1]. Nevertheless, the period during which the terminal is built will mean heavier traffic that will call for tight coordination, especially since it could coincide with the delivery and construction of SkyPower's windmills, projected for the summer of 2007, if the project goes forward (DB38, p. 8; DM17, p. 6 and Mr. Denis Bastien, DT2, p. 64; Terrawinds Resources Corporation, 2006b).

Based on an opinion from Natural Resources Canada, Transport Canada feels pursuit of port activities would be safe. Transport Canada also considers that the port can continue to do its part for regional economic development. Nevertheless, the LNG

1. [On line June 16, 2006: www.mtq.gouv.qc.ca/fr/modes/maritime/politique.asp]

terminal would reduce available space for new traffic in the harbour and, if it is thought necessary, Transport Canada anticipates enlarging exterior warehousing space by filling in part of the western basin of the industrial zone. This development scenario could be brought into question by the eventual location of the gas pipeline, which, it is worth remembering, could be an obstacle to development of the harbour. In this respect, the Department also considers that an increase of the land safety perimeter, following a revision of Standard CSA-Z276-01, which already has undergone seven modifications since it was first published and for which a new publication is planned for 2007, would be a significant constraint (Mr. Denis Bastien, DT2, p. 63 and 64; DB37.1, p. 6; DB38, p. 9). Therefore, there is a chance that requirements related to the safety perimeter could be modified later and, consequently, that the size of the project's safety perimeter could change. While this is hypothetical, such a change could restrict current port and recreational activities in adjacent areas.

The planned LNG terminal's security perimeter includes the northern portion of the port, which does not lend itself to commercial navigation because of a rocky shoal. The available space may be sufficient to plan a port facility for pleasure craft along the northern seawall. It already is used occasionally by pleasure craft and may be the only safe shelter available at all times between Berthier-sur-Mer and Rimouski. The Corporation du port de plaisance Gros-Cacouna (The Gros-Cacouna Pleasure Craft Corporation) has been trying to get the Rivière-du-Loup marina's equipment moved there because Rivière-du-Loup faces major access restrictions due to the fact it is filling in with sand. Use of Gros-Cacouna harbour would preclude construction of new seawalls, reducing considerably the cost of the project approved by the MRC of Kamouraska, the MRC and the City of Rivière-du-Loup, as well as the Village and Parish of Saint-Georges-de-Cacouna in 1999 and 2000. Transport Canada opposed it on the grounds that such tourism would hinder development of port activities (DM84).

- *Finding – The Panel found that during the LNG terminal construction period, Transport Canada would have to coordinate activities in the harbour and on the access route diligently, so that the project does not hinder use of the harbour by others.*

- *Finding – The Panel found that uncertainties remain regarding the limitations that construction of an LNG terminal could impose on the operation and development of the Port of Gros-Cacouna, particularly in relation to the land security perimeter which could be modified as a result of the updating of the standard CS-Z276-01in 2007, and in relation to the gas pipeline route.*

- *Finding – The Panel found that establishment of a land security perimeter as part of the construction of an LNG terminal could limit the use by recreational boaters of the northern part of the Port of Gros-Cacouna mooring areas, either as an occasional shelter or because activities would be transferred from the Rivière-du-Loup marina.*

- ***Recommendation 22 –*** *The Panel recommends that Transport Canada provide an area in the Port of Gros-Cacouna in order to continue providing recreational boaters with a safe, accessible haven at all times in case of unforeseen problems. The proponent should assume any cost for such a measure.*

Tourism activities

Sea kayaking

Every year, the shoreline of the estuary in the Lower St. Lawrence region attracts many boaters, including sea kayakers.

According to the Fédération québécoise du canot et du kayak (Quebec Federation of canoeing and kayaking) and the Route bleue du sud de l'estuaire (The Southern Estuary Water Trail) organization, sea kayaking has grown significantly over the past decade. With inauguration of the "Route bleue du sud de l'estuaire", every indication is that the number of people taking part in the activity will keep rising. The "Route bleue du sud de l'estuaire" was the first water trail established in a network of five "routes bleues" that are part of the "Sentier maritime du Saint-Laurent" (The St. Lawrence Maritime Trail). From Berthier-sur-Mer to Méchins, this water trail offers users such services as a network of watering stops, emergency landings, rest areas, as well as food and lodging. It follows the Cacouna shoreline and, as a result, goes close to the site of the planned LNG terminal (DM11, p. 1 to 6).

From the Fédération's standpoint, although sea kayaking on the St. Lawrence River is popular, it is not without risk, since conditions affecting boating vary greatly from one part of the estuary to the other. Water temperature, exposure to wind, tides, and strong currents risk putting kayakers in danger. In the Cacouna area, during periods of high winds, major areas of chop and powerful tidal eddies can develop that make boating difficult. Whether beginners or experts, under these circumstances, kayakers have no interest in getting too far from shore. This is exactly what worries the Fédération about the exclusion zone planned by proponent.

On this issue, the proponent feels that kayakers will have to go around the marine facilities during construction of the LNG terminal. During operation, beyond the requirement to go around the 350-m jetty where the limits are set by buoys, kayakers must respect a 300-m safety perimeter around the berthing wharf when an LNG tanker is berthed. If there is no LNG tanker, the perimeter would be reduced to 50 m. Nevertheless, the case for the safety perimeter still must be made with Transport Canada, which does not seem convinced of the need and concludes "the proponent

does not have the authority to establish such a security perimeter […] which, if it is justified, can be established through a regulation under Article 562.1 of the *Canada Shipping Act*. In the event that this safety perimeter stays, it will make kayakers detour several hundred metres out toward open water. The proponent agrees that (translation) "this restriction could prove difficult and have serious consequences for kayakers' safety. When there are winds the safety perimeter will prove a real obstacle to kayakers" (Mr. John Van Der Put, DT3, p. 39; DQ31.1, p. 2; PR3.1, p. 7-70).

The proponent met with the Fédération on this issue. The proponent's proposed safety measures are to inform the Fédération about an LNG tanker so it can inform its members at least 24 hours ahead of time, to set up a shuttle system so kayakers can get around the terminal, and, finally, have tugboats, when present, help or warn kayakers who might get too close to the terminal (Mr. John Van Der Put, DT3, p. 38 and 39). On this point, the Panel feels that tugboats operators will be too busy with their various manoeuvres in support of LNC tankers to assist kayakers. In any event, for safety reasons, because a tugboat is much bigger than a kayak, it is not clear that this is the preferred type of vessel in which to approach a kayak. A small boat would be more appropriate in the Panel's view.

In the opinion of the Fédération québécoise du canot et du kayak et the Route bleue du sud de l'estuaire organization, an efficient means of communication, such as information billboards on the shores adjacent to the natural gas port, as well as a water or land-based shuttle system, would be appropriate concrete measures to reduce the risk of accidents:

> All we want is that people be informed, that, in the final analysis, they be made aware of this situation, and that, ultimately, we can save lives. Thus, the most practical solution is the one that should be retained.
> (Mr. Roger De La Durantaye, DT10, p. 17)

Beyond the repercussions for kayakers' safety, the Fédération thinks that the LNG terminal could detract from the water trail's attractiveness to users. It foresees a possibility that the terminal would cut the trail off right in the middle, creating "a psychological barrier". Kayakers, not knowing how to get around the security perimeter and dreading the experience in the case of bad weather, might be tempted to cut short their trip, depriving themselves of a visit to "one of the jewels of the Route bleue du sud de l'estuaire: the island known as île Verte." This could reduce the sought-after economic benefits, endangering the organization's economic viability. Consequently, to make up for the Route bleu's drop in popularity, the Fédération québécoise du canot et du kayak and the Route bleue du sud de l'estuaire organization want the proponent to take part in innovative promotion and development of rustic campsites, funding promotional activities without insisting on corporate

visibility in return. They want the proponent to assume responsibility for insurance premiums arising from addition of private sites to the existing water trail, which has none at present due to the organization's limited financial resources (DM11, p. 12 and 13).

- *Finding – The Panel found that the presence of an LNG terminal and its security perimeter could compromise sea kayaking in the Cacouna area because of difficulties kayakers might have getting around the jetty or an LNG tanker.*

- ***Opinion 30 –*** *The Panel is of the opinion that the proponent, the Fédération québécoise du canot et du kayak, and the organization Route bleue du sud de l'estuaire should agree on measures to mitigate the effects on sea kayaker safety. A marine or land shuttle service to inform or, as required, help people involved in this activity, would be an interesting initiative for the proponent to implement.*

- ***Opinion 31 –*** *The Panel is of the opinion that the proponent, the Fédération québécoise du canot et du kayak, and the organization Route bleue du sud de l'estuaire should agree on measures to compensate for a possible drop in attraction to the Cacouna and île Verte areas for kayakers due to the presence of the LNG terminal.*

The île Verte emergency link

Île Verte does not have a fixed link with the mainland. From May to December, at high tide, only a ferry and a water taxi transport goods, vehicles and passengers between the mainland and the island. In the winter, from January to mid-March, an ice bridge allows the movement of snowmobiles[1]. In December and from mid-March to the end of April, helicopter service is also available. As the helicopter usually used cannot evacuate someone on a stretcher, islanders must use a motorboat for emergency evacuations when both the ferry and the ice bridge are unavailable. Such evacuations leave from Pointe du Bout d'en Haut de l'île and go towards Gros-Cacouna harbour, then to the Grand Portage regional hospital in Rivière-du-loup (Comité de santé de l'île Verte, DM39, p. 2).

The boat would have to stay 50 m away from the berthing wharf, and would possibly have to move off to a distance of 300 m when an LNG tanker is berthed. The proponent admitted being aware of this, but did not suggest specific measures to deal with it during the public hearings (Mr. Carl Lussier, DT5, p. 57 to 61).

1. [On line (July 31, 2006): www.ileverte.net/hiver.html]

- ***Recommendation 23 –*** *The Panel recommends that the proponent provide the île Verte health committee with the means to get around the LNG terminal berthing wharf, so that it will not constitute an obstacle for boats used to evacuate people in emergencies.*

Economic benefits of the project

The proponent presented the results of a standard economic projection of the project's economic benefits using a model designed by the Institut de la statistique du Québec (Quebec Institute of Statistics). This model calculates the direct, indirect and induced effects on added value, employment, and the revenues collected by the federal and provincial governments. In using this model, the proponent respected best practices in this field and recognized its limits. It is not a forecast of economic benefits, but an estimate that is subject to simplifying assumptions. The model is applied to the entire Quebec economy considered at the regional level. There is no model available that would allow more detailed disaggregation for regions within Quebec. The proponent, nevertheless, did a summary analysis for the Lower St. Lawrence administrative region that reflected the situation locally, and conceded the exercise's limitations. Results are shown separately for the project's construction phase and for its operating phase (PR3.1, Section 7.5.1).

During construction, the proponent estimates that direct employment in Quebec (regional level) would be 1 965 person-years during the three years of construction work, for an annual average of 655. On the basis of available data, the proponent suggests that about 22% of the direct employment would be filled by workers from the Lower St. Lawrence region during the peak construction period. The total of direct, indirect and induced employment would be a little over double, or about 4 435 person-years. Tax levies collected by the Government of Quebec and its agencies in 2004 dollars would reach $27.3 million while those of the federal government and its agencies would be $9.2 million. The total benefit (direct, indirect and induced) would mean that the governments of Canada and Quebec respectively would receive $57.3 million and $24.9 million (PR8.7, Q-176).

During LNG terminal operation, including recurring benefits during its productive lifespan, annual employment would be 35 positions of which two thirds would be specialized for a total of 137 person-years, and of which 73 would be indirect employment. The Government of Quebec and its agencies would collect $737 000 in direct benefits and a total of $2 029 000 annually. The respective figures for the federal government and its agencies would be $370 000 and $950 000.

In the Lower St. Lawrence administrative region, the employment benefits would be lower, that is 2,689 person-years for construction, or 60% of the total, and 46 person-years for operations, or 34%. This would apply to all of Quebec.

Moreover, the proponent showed only limited interest in local suppliers of products and services for the construction phase, raising arguments about their small size and the short period of time between eventual authorization of the project and the start of work. During the public hearings, the Centre local de développement (Local Development Authority), local chambers of commerce, and other stakeholders called on the proponent to make a stronger commitment to suppliers from the region (PR5.1, QC-038).

- ***Opinion 32 –*** *The Panel is of the opinion that the proponent should inform suppliers in the region of the needs linked to the work to help them participate in the contract tendering process.*

At present, the municipality collects $1.5 million in municipal taxes. The owner of the LNG terminal would pay $5.05 million annually in 2005 dollars in lieu of property taxes to the Municipality of Cacouna and $1.3 million in school taxes to the Kamouraska–Rivière-du-Loup and Central Quebec school boards[1]. The amount of municipal taxes would be indexed annually, based on the Consumer Price Index, up to 2% while school taxes would be indexed based on the school taxes collected by the two school boards with a 5% ceiling. From the amount received, the Municipality would turn over a certain amount to the municipality of Notre-Dame-des-Sept-Douleurs every year. How much remains to be confirmed. Furthermore, $150 000 would be turned over to the Malécite de Viger First Nation, if an agreement is reached with it. Finally, $500 000 would be turned over to the MRC of Rivière-du-Loup, which should be spent mainly on communities that suffer economic decline (Mr. Jacques M. Michaud, DT7, p. 69; DM45, p. 8; DQ39.1, p. 2).

Although the Municipality of Cacouna offered some details on what it plans to do with the amounts that it will keep, it has yet to indicate if it would earmark them for priority spending in areas of the municipality disadvantaged by the construction and operation of the LNG terminal.

1. *Act Regarding the Municipality of Cacouna*, Private Bill No. 205, Adopted June 15, 2006.

Requirements for municipal services and worksite proximity

A number of municipal services would be needed for the project, mainly the road network, water distribution, sewage, as well as waste management. Among other things, concern was expressed about a major influx of workers from outside the community.

Municipal services

The proponent plans to use certain municipal services. This will be the case with water needed for general use on the site and mixing of concrete, the sewer system, and firefighting. Regarding the municipal road system, the proponent is committed to upgrade the roads in front of the work site and restore them, as required, once work is completed (PR3.1, p. 7-13 to 7-15).

For the past few years the Municipality of Cacouna has been seeking new sources of supply for drinking water. During the second part of the public hearings, the proponent still had not indicated to the Municipality what the water requirements would be for the worksite. It seems that the proponent has sought other sources of supply for raw water needs, such as a well bored on the site or even drawing from the estuary without providing detailed plans (Mr. Jacques Michaud, DT12, p. 38; PR3.1, p. 2-101 and 2-102). Furthermore, waste management for this major worksite was not analyzed in the proponent's impact study.

The municipal wastewater treatment system apparently does not perform up to its full capacity because it now operates at 30% of its capacity. According to the Municipality, the increased demand from worksite wastewater could increase the system's performance (Mr. Jacques Michaud, DT12, p. 39; DQ11.1, p. 2).

- *Finding – The Panel found that the supply of water to the project using the infrastructure of the Municipality of Cacouna, which is now looking for new sources of supply, has not yet been assessed by the proponent and is not guarantee.*

- ***Recommendation 24 –*** *The Panel recommends that the sources of project water supply be defined and authorized as part of the this environmental assessment.*

- ***Recommendation 25 –*** *The Panel recommends that the proponent submit a residual matter management plan to the Ministry of Sustainable Development, Environment and Parks as part of this environmental assessment.*

Establishment of the construction site near the community

Considering the small population of the Municipality of Cacouna, concern was expressed during the public hearings about the arrival of hundreds of workers from outside the region. Problems related to temporary workers living in close proximity to the current residents were mentioned. Based on previous experience with large work sites, a consultant hired by the proponent put the concerns in perspective, noting that the temporary camp originally planned near the centre of the village is no longer being considered, and that the workforce recruited outside the region would be accommodated throughout a radius of 25 km or more. The workers would get to the industrial sector of Cacouna via Highway 20 and the port access road, without going through the village, and would then be transported by bus to the construction site (Mr. Paul Wilkinson, DT7, p. 60 and 61).

Therefore, the proponent believes that the residents of Cacouna would not be disturbed by the presence of the workers and that the possibility of conflicts would be greatly reduced, given that the capacity of the village to accommodate people is low (PR8.7, Q-174 and Q-178).

Rather, the impacts of the project on social cohesion in the community and the quality of life of the residents were rather emphasized by Health Canada and the Centre de santé et de services sociaux de Rivière-du-Loup. Whether or not the project is carried out, the social division, which was noted by several participants, represents for these organizations a social impact that is already causing problems and that deserves careful follow-up (DB36, p. 9; DM62, p. 5).

According to Health Canada, social cohesion is defined as a common set of values and interpretations, as well as the feeling of belonging to a community. The more cohesive communities show better health indicators than those that are less cohesive. The public hearings, like the consultations carried out by the proponent, revealed a polarization of two visions of development in the area: on one hand industrial, and on the other hand development based on the natural environmental and heritage resources. In addition, the quality of life associated to with resources is highly valued by the population. According to these people, considerable effort will be needed to reunite this small community of some 1,850 people (DM62, p. 5).

Health Canada wants follow-up on the social impacts of the project in three stages: before commencement of the project, 18 months after work begins, and 18 months after construction is completed. This final assessment would make it possible to document the repercussions of closing the construction site. The proponent plans a follow-up based on the use of a telephone line, a Web site, and questionnaires, as well as a process to manage complaints. A community relations committee

comprising members of the management of Cacouna Energy and the community would be established from the start of construction. It could include psychologists, social workers, and community organizers (DB36, p. 10; PR8.7, Q-174; PR5.2.1, QC2-034; DA5, p. 21).

- *Finding – The Panel found that, although the size of the construction site when compared to the size of the community of Cacouna could cause concern, it is the social tensions already present in relation to the appropriateness of the project that seems to be of greater concern to Health Canada and the Centre de santé et de services sociaux de Rivière-du-Loup.*

- ***Opinion 33 –*** *The Panel is of the opinion that Health Canada and the Centre de santé et de services sociaux de Rivière-du-Loup, in collaboration with the community and the proponent, should participate in determining the need for follow-up on the social impacts on the community of Cacouna. The Panel invites the concerned parties to look at existing public participation techniques in order to determine the best tool for achieving this objective.*

Chapter 6 Technological risks

In order to assess the risks associated with the proposed LNG terminal land facilities and by the transportation of LNG, the Panel reviewed the assessment of technological risks conducted by the proponent as well as the opinions of the resource people consulted. It first reviewed the origin and the risk factors, and then analysed the assessment of technological risks as well as the security of the facilities and the emergency measures plans.

Origin of risks

LNG is natural gas maintained in liquid form at a temperature of -160ºC. In this state, it is neither explosive nor inflammable and its volume is reduced by a factor of about 600 compared to its volume as a gas. It is clear, transparent, odourless, non-corrosive, and non-toxic. Owing to its cryogenic nature, LNG freezes everything with which it comes into contact. When heated, it goes to its gaseous phase (Natural Resources Canada, 2005a, p. 1).

Natural gas is not explosive if it is not confined. It is flammable when it is in a concentration range in ambient air from 5 to 15%. When its concentration exceeds 15%, the quantity of oxygen available is insufficient for combustion. That is the upper limit for it to be inflammable. When the concentration is less than 5%, the quantity of natural gas is insufficient for combustion. That is the lower limit for it to be inflammable. Natural gas, by displacing oxygen, acts as a simple asphyxiant (DB21, p. 4; DA1, p. 2-2; Gaz Métro, 2005, p. 2).

When LNG is spilled on water, the heat of the water is rapidly transferred to the LNG, which enters its gaseous phase. The natural gas would not ignite, but the sudden expansion of the gas could create excess pressure in the air or the water (PR3.1, p. 9-81).

Although LNG terminal operation would involve other dangerous substances such as sodium hydroxide and sodium hypochlorite, the Panel nonetheless focused its analysis on LNG since the consequences of an accident involving LNG could reach well beyond the limits of the terminal.

Risks factors

Despite prevention measures deployed by industries that use dangerous substances, it is impossible to reduce the risk of accident to zero. The sources of risk are varied, but the Panel reviewed two in greater detail: seismic risk and climate risks.

Seismic risk

The LNG terminal project is located near the Charlevoix region, a region known for its seismic activity as five earthquakes of a magnitude exceeding 6 on the Richter[1] scale have occurred in the past 350 years. Therefore, Natural Resources Canada asked the proponent to have an expert assess the seismic risk of the LNG terminal site.

The standard CSA-Z276-01 requires that the proponent design facilities so that they can resist an earthquake with a 475-year return period, and so that operations can proceed as usual. These facilities must also be able to resist an earthquake with a 1000-year return period and still enable a safe shutdown of operations. However, this standard is being revised and more conservative design parameters are being retained for North American LNG terminal projects. In this regard, Natural Resources Canada considers that it is better to design Canadian LNG terminals so that they can resist earthquakes with a 5000-year return period and still enable safe shutdown of operations. After having reviewed the proponent's assessment of seismic risk, Natural Resources Canada concluded that the information is sufficiently detailed to correctly assess the risk and enable the proponent to design the terminal appropriately (Canadian Standards Association 2003; DA4, p. 3 to 7; DB37.1, p. 4 and 6).

In the case of this project, that means that the facilities should resist an earthquake of a magnitude of 7 on the Richter scale with the epicentre located approximately 25 km away. Natural Resources Canada considers that the proponent is in a position to take measures to protect against earthquakes of this magnitude, and noted that there are LNG terminals in areas of similar or greater seismic activity (DA4, p. 3; DB37.1, p. 2; PR3.1, p. 3-9; PR8.7, Q-037, C-027, C-073 and AC-QC-010).

- *Finding – The Panel found that Natural Resources Canada considers the LNG terminal should be designed to resist an earthquake of magnitude 7 on the Richter scale, with the epicentre being about 25 km away, and which could have a more*

1. To calculate the magnitude, the amplitude of waves recorded on a seismograph are measured taking into account the distance between the recording instrument and the earthquake's epicentre. The Richter scale is based on a logarithmic relation. That means that at an equal distance, the amplitude of vibrations of an earthquake with a magnitude of 6 is ten times greater than that of an earthquake with a magnitude of 5.

severe return period than the one currently proposed by the standard CSA-Z276-01, namely 5,000 years.

The government authority responsible for seeing that the LNG terminal is designed to meet the requirements set forth by Natural Resources Canada does not, however, appear to be known at this time. What is more, it seems that viewpoints differ on this issue, with the Régie du bâtiment arguing that, since the project is to be built on federal lands, it will be under Transport Canada's jurisdiction and not the Régie's jurisdiction. Natural Resources Canada seems to support the proponent's intention to work with the Régie du bâtiment to ensure that seismic risks are appropriately taken into account (PR6.1, p. 3; PR8.7, C-072; DB37.1, p. 3).

- ***Recommendation 26 –*** *The Panel recommends that discussions take place between the Ministry of Sustainable Development, Environment and Parks and Transport Canada so as to identify, at the environmental assessment stage of the project, which government authority will ensure that earthquake risks are correctly taken into account in design of the LNG terminal.*

Climatic risks

The St. Lawrence estuary can be a challenge in all seasons for navigation since, year round, storms can occur and cause strong winds and waves more than three meters high. Rapid movements of built up drift ice caused by tides are frequent, and periods of fog, rain, and snow can reduce visibility to less than 2 km at any time during the year (DA8, p. 19 and 22 to 30; Mr. John Van Der Put, DT3, p. 34 and 35). The Panel reviewed in greater detail two phenomena that are likely to require emergency maneuvers by the LNG tankers or that could lead to LNG spills, namely strong winds and massive ice *floes* drifting towards the berthing wharf.

In case of winds exceeding 25 knots or serious breaking up of ice near the berthing wharf, it is planned that the LNG tanker would not dock and that it would use the emergency anchoring points and wait for favourable conditions. If the LNG tanker is docked when the wind speed increases, the LNG unloading operations could be interrupted so as to prevent the unloading pipes from breaking. The LNG tanker could even leave if there were a risk of collision with the wharf. The proponent plans to follow the weather forecasts so as to be able to react quickly or take preventive measures (Mr. John Van Der Put, DT3, p. 34 to 37; Mr. Jean Fortier, DT7, p. 115 to 118; PR8.1, p. 2-13).

Massive ice *floes* drifting in the estuary could possibly collide with the berthing wharf. The proponent simulated ice movements and incorporated into the design loads the shear forces that they could cause if the ice collided with wharf piles, with or without

an LNG tanker docked there. In its August 2006 modifications, the proponent took this factor into account for the construction of the berthing wharf. Since the LNG tanker could be compressed by the ice or remain trapped, the proponent plans to keep tugs ready to push the ice away. Transport Canada indicated to the Panel that the proponent has presented a plan that meets the needs for control and management of navigation safety near the berthing wharf (DA10, p. 49; PR5.0, QC-024; PR8.7, Q-024, Q-219; DQ19.1, BAPE002; DB38; DA46.2, p. 9).

- *Finding – The Panel found that Transport Canada is satisfied with the means planned by the proponent for managing drift ice likely to collide with the LNG terminal berthing wharf, particularly when an LNG tanker is moored there.*

The proponent has committed to having LNG tankers designed to navigate on the St. Lawrence in all seasons. This aspect is taken into account by Transport Canada in the TERMPOL process (PR8.7, Q-188; DQ2.2, p. 1).

Evaluation of technological risks

Combustion of natural gas is the main risk that could cause repercussions outside the limits of the proposed LNG tanker terminal property and that was retained by the proponent for assessment of technological risks. An LNG spill would evaporate and form a cloud of natural gas. If that gas were to come into contact with a source of combustion and if the concentration of natural gas in the ambient air were from 5 to 15%, a fire causing intense heat could occur (DB21, p. 4; PR3.1, p. 9-15).

The thermal radiation from a fire is measured in kilowatts per square meter (kW/m^2). Heat diminishes with the distance from the source and people exposed suffer burns at different degrees depending on the distance and the duration of exposure. For example, after 40 seconds a person exposed to thermal radiation of 5 kW/m^2 can receive second degree burns. This level defines the area where individuals could suffer serious injury. A thermal radiation of 13 kW/m^2 can cause death in 30 seconds. For the MDDEP, the recommended threshold for planning emergency measures is 5 kW/m^2 (2002b, p. 13). The Panel refers to this threshold in its review of project risk evaluation.

Methodology used

Following a hazard determination process, the proponent retained 133 accident scenarios. The technological risk is defined as the product of the probability that an accident will occur and the consequences that result. These accident scenarios can be grouped into four categories:

– Scenarios concerning LNG tankers;

– Scenarios related to LNG unloading operations;

– Scenarios concerning LNG storage tanks;

– Scenarios concerning terminal processing equipment[1].

The proponent then retained the worst case for each of these categories. None includes the risk of explosion even though explosions are considered in the assessment. Concerning the validity of the choice of accident scenarios, the MDDEP mentioned in the public hearings that the scenarios were conservative enough to make a judgment on the potential consequences linked to the land facilities (PR3.1, p. 9-37 to 9-69; DQ1.3, BAPE2.7; Ms. Marie-Claude Théberge, DT3, p. 8). For its analysis, the Panel retained the worst case scenario for each of the categories.

According to the proponent, the technological risk assessment limits had been established based primarily on the MDDEP criteria. However, during public hearings the MDDEP spokesperson pointed out that the proponent's approach was different from the one recommended by the MDDEP, but that the risk analysis is acceptable (PR3.1, p. 9-19; Mr. Yves Rochon, DT2, p. 26).

The Agence de la santé et des services sociaux du Bas-Saint-Laurent, even though in agreement with the recommended method for assessing risks, was concerned that this method did not enable all participants in the public hearings to appreciate the nature and the scope of the consequences of a possible major industrial accident. The Agence is of the opinion that, in its current form, this method will not allow the main stakeholders to prepare themselves suitably in case of an accident. It also found it unacceptable that this information will only be available during the work of the joint municipal/industry committee (Comité mixte municipal-industriel (CMMI)), that is, after the government has decided on the project (Mr. Bernard Pouliot, DM22, p. 2 and 3).

Transport Canada indicated that the proponent has demonstrated that it followed the applicable standards, particularly the standard CSA-Z276-01, as well as a structured risk-determination process (DB38, p. 3).

Participants in the public hearings nonetheless remained worried about the proponent's risk assessment. Some referred to a similar project presented by the same proponent that was the subject of a public hearing by the BAPE in 1981

1. Processing equipment includes operating facilities and related piping for receiving, transporting, and processing LNG and natural gas, including the nitrogen plant.

(report 5), in which the potential consequences of an accident were more serious. On this point, Environment Canada corrected its conclusions from that time, pointing out that the tools and the methodology used in the risk assessment for the Energy Cacouna LNG terminal project meet the current standards and regulatory requirements. Environment Canada also mentioned that "we recommend use of the results of the 2006 risk analysis which are on the leading edge of science, rather than those from 1981. It is to be remembered that today's computer programs are conservative and give impact ranges that exceed reality" (DB39, p. 4).

The proponent did not take into account the natural gas pipeline and its potential impacts, particularly on the LNG terminal, asserting that all of that would be considered during the gas pipeline project environmental assessment. The Panel requested unsuccessfully that the proponent study these risks on Transport Canada port lands.

- *Finding – The Panel found that the Ministry of Sustainable Development, Environment and Parks, the Agence de la santé et des services sociaux du Bas-Saint-Laurent, Transport Canada and Environment Canada consider the methodology used by the proponent to be acceptable for analysing the technological risks.*

- ***Opinion 34 –*** *The Panel is of the opinion that the concerns of the Agence de la santé et des services sociaux du Bas-Saint-Laurent regarding analysis of technological risks should be reviewed in an inter-ministerial consultation led by the Ministry of Sustainable Development, Environment and Parks as part of the current environmental assessment of the LNG terminal project.*

- ***Recommendation 27 –*** *The Panel recommends that the Ministry of Sustainable Development, Environment and Parks and Transport Canada ask the proponent to conduct, as part of this environmental assessment, an analysis for risks linked to the presence of the gas pipeline in the LNG terminal project study zone that will take into account potential cumulative effects.*

On-land risks

The proponent plans to implement leak detection and monitoring systems, spill confinement measures, emergency disconnection mechanisms, and fire protection during LNG terminal operation. It will also install full containment tanks, a control room for real-time monitoring of operations, and an on-land security perimeter. This perimeter was established to meet standard CSA-Z276-01 and the requirements proposed in the 2005 edition of the United States standard NFPA 59A. To assess it, the proponent considered two accident scenarios and, in light of the results obtained, retained a value of the order of 350 m (PR3.1, p. 9-12; Mr. Ernst Meyer, DT2, p. 23; PR5.1, QC043 and QC046; PR8.7.1.1, Q2-03, p. 2; Mr. John Van Der Put, DT1, p. 61).

The MDDEP deemed the security measures proposed by the proponent in its impact statement to be satisfactory, considering its commitment to respect the National Building Code and standard CSA-Z276-01.Transport Canada, who analysed more particularly the LNG unloading process, was of the opinion that the proposed security measures would provide adequate protection for the public and the workers (DQ23.1; DB38, p. 4).

As part of the August 2006 project modifications, the proponent indicated that it had moved the vent stack, which is part of the LNG storage tank pressurization system, onto the berthing wharf jetty so as to avoid design problems (Figure 2). In addition, the LNG spill retention basin was replaced by three smaller basins, the proponent's main goal being to minimize the gas cloud dispersion in case of a leak. Other modifications to the on-land facilities, including the relocation of the storage tanks by a few dozen meters, were also made. According to the proponent, these modifications, combined with an updating of calculations, would comply with standards CSA-Z276-01 and NFPA 59A. The proponent stated that they would only bring about minor changes to the risk isocontours, and would result in an expansion of the security perimeter by about 70 m towards the southeast (DA46.2, p. 20 and 21; DQ40.2, BAPE3-006).

Questioned about these changes by the Panel, Transport Canada and the MDDEP were of the opinion that the proponent should present an update of its technological risk assessment to verify the acceptability of the project modifications (DQ42.1, p. 2; DQ44.1, p. 2 and 3).

- ***Recommendation 28 –*** *The Panel recommends that the proponent update his technological risk assessment for the projected LNG terminal and submit it to Transport Canada and to the Ministry of Sustainable Development, Environment and Parks as part of this environmental assessment. This updating should take into account the proponent's technical revision of the project and the various recommendations of the Panel.*

The three worst-case on-land accident scenarios are presented in Table 7.

Table 7 Three worst-case on-land accident scenarios

Type of Scenario	Distance for thermal radiation of 5 kW/m^2 (m)	Natural gas cloud flammability limit (m)
LNG offloading line	230	360
LNG storage tanks	125 (at ground level) 210 (at 30 m above ground)	130
LNG vaporization equipment	310	240

Source: adapted from PR3.1, p. 9-70.

The proponent is of the opinion that the dispersion of the natural gas cloud and the thermal radiation associated with a major accident at the on-land facilities would not extend beyond the limits of the LNG terminal property, and would not cause any risk to people outside that limit. The people most vulnerable to the consequences of these on-land accident scenarios would be the LNG terminal workers (PR3.1, p. 9-79).

Marine risks

The risks posed by LNG tankers travelling on the St. Lawrence, especially collisions and grounding, were not addressed in the impact study except for when the LNG tankers approach the LNG terminal berthing wharf. These risks are nonetheless analysed in the TERMPOL process (PR3.1, p. 9-19).

Given that the TERMPOL process report was not available when the public hearings were held, several participants were critical of the fact that they were unable to have access to this information. Transport Canada indicated in a brief filed with the Panel that the proponent presented a good picture of the risks linked to navigation, and had proposed appropriate mitigation measures for the area between the eastern limit of the St. Lawrence estuary and the LNG terminal. If it turned out that certain measures were insufficient, Transport Canada could always intervene under the *Canada Shipping Act* (C.S.R. (1985), c. S-9) to require changes (DB38, p. 5).

From Les Escoumins, the LNG tankers would head towards the LNG terminal, going around île Rouge to the south or to the north. The Mayor of Notre-Dame-des-Sept-Douleurs was concerned about the potential consequences of an accident occurring when a LNG tanker is close to île Verte. According to Transport Canada, both proposed routes could be taken without any major effects on navigation in these sectors, but Transport Canada points out that marine traffic density is lower to the south of île Rouge than to the north, and that this should be considered in the risk analysis. However, the Panel noted that the southern route could disturb the beluga whales and added that residents of île Verte would be more exposed to the presence of LNG tankers. The proponent mentioned that an LNG tanker would go by at a distance of approximately 2.5 to 3 km from île Verte, and that a natural gas cloud could not reach the island if ever the LNG was spilled (Mr. Gilbert Delage, DT5, p. 3; DB38, p. 5; Mr. Ernst Meyer, DT5, p. 5). The Panel considers, however, that the route to the north of île Rouge would reassure the île Verte residents.

- ***Opinion 35 –*** *The Panel is of the opinion that it is desirable for the technical assessment process for marine terminals and transhipment sites to incorporate the concerns of the public and the Panel as expressed during the environmental assessment process.*

- ***Recommendation 29 –*** *The Panel recommends that, before an LNG tanker approach route to the LNG terminal south or north of île Rouge is established, Transport Canada take into account the environmental impacts in addition to the safety aspects.*

LNG tanker security measures

Security measures would be implemented for the LNG tankers. They would have a double hull that would be reinforced for ice, and their tanks would have a double lining (Mr. Ernst Meyer, DT2, p. 23). Other measures are planned, such as tugs to accompany the LNG tankers, presence of navigation aids, and a security perimeter of some 300 m from the berthing wharf when an LNG tanker is there and 50 m when there is none. Unlike the land security perimeter, the 50 m perimeter was not established under the standard CSA-Z276-01:

> This distance is a judgment made by Energy Cacouna based on a potential accident […] from a break in the unloading arm, and an accident linked to an LNG spill and the distance over which it could have an effect. This was proposed by Transport Canada to the TERMPOL committee […].
> (Mr. John Van Der Put, DT4, p. 46)

As was mentioned earlier, Transport Canada considered that the security perimeter proposed by the proponent would not be necessary, based on information provided by the proponent. Moreover, Transport Canada was of the opinion that the security measures proposed would be sufficient. In the future, if certain measures proved to be insufficient, corrective measures could be required under the *Canada Shipping Act* (DQ31.1, p. 2; DB38, p. 6).

- *Finding – The Panel found that the value of the marine security perimeter will be verified during the technical assessment process for marine terminals and transhipment sites administered by Transport Canada. It also found that Transport Canada considers that the safety measures proposed by the proponent are in conformity.*

The marine accident scenario

Although the proponent qualifies the probability of the worst case marine accident scenario as very unlikely (i.e., under one in three million years), the consequences could go beyond the site limits. The limit for 5 kW/m^2 thermal radiation would be 1 365 m and the lower limit for combustion was determined by the proponent to be 1 825 m (PR3.1, p. 9-67). In the case in which a cloud of natural gas were to disperse without immediate ignition but met a source of combustion, a fire could occur. The resulting thermal radiation could then be felt well beyond 1 800 m from the spill point.

Figure 8 shows that the LNG tanker terminal workers could be seriously affected by the consequences of such a scenario, since they would be subjected to intense thermal radiation reaching up to 37.5 kW/m^2.

The Cacouna marsh and the Gros Cacouna peninsula are often visited by bird watchers and hikers who might be in the 5 kW/m^2 impact area. This is also the case for recreational boaters and kayakers who were near the LNG tanker terminal. As for the nearest cottage, located about 1 km from the LNG terminal, it would also be in the impact area (DQ1.1 and Appendix 1).

Excluding cottages, the residence closest to the LNG terminal is located at about 1.5 km from the centre of the facilities *(ibid*.). According to Figure 8, Cacouna residents and Gros-Cacouna port workers could be exposed to thermal radiation under 5 kW/m^2, but they could be more seriously affected if the LNG leak formed a natural gas cloud that did not immediately ignite.

The Panel would like to mention the report produced for Vision Cacouna by James A. Fay, Emeritus Professor at the *Massachusetts Institute of Technology*, on the marine safety of the project. Mr. Fay compares the proponent's study to two other studies conducted by the *Sandia Laboratory* and United States *Federal Energy Regulatory Commission*. These studies consider a typical LNG spill scenario from an LNG tanker. As regards distances obtained for thermal radiation, the results of the studies are comparable. However, the distances for the combustion zone from a natural gas cloud differ significantly with the study. For Fay, the explanation lies in the fact that the methodology differs depending on the study and that there is a lack of experimental data. He points out that by taking the average of the results of the three studies, an accident of this type could have repercussions up to 3.8 km. However, he did not attribute a probability to such an event (*Sandia National Laboratories*, 2004 and *Federal Energy Regulatory Commission*, 2004; DM76.1, report of May 10, 2006, p. 2).

On another issue, at Transport Canada's request the proponent's risk assessment was reviewed by specialists from Natural Resources Canada to determine if effects on Gros-Cacouna port operations were possible. The proponent's results are apparently credible and the risks acceptable for port workers. Natural Resources Canada nonetheless issued some recommendations, particularly regarding risks linked to the handling of explosives at the port (Mr. Phil Lightfoot, DT3, p. 4-5; DB21, p. 2).

- *Finding – The Panel found that in the case of the worst-case marine accident scenario indicated by the proponent, it is possible that third parties will be in the impact area of a fire fuelled by liquefied natural gas. The Panel agrees however that the probability of such an accident occurring is low.*

- *Finding – The Panel found that, according to a comparative study conducted for public hearing participants, the consequences of a liquefied natural gas spill from an LNG tanker could be felt up to 3.8 km. However, it notes that no probability is attributed to this event.*

Individual risk

The MDDEP defines individual risk as the annual risk that an individual located at a given place has of suffering the consequences under consideration, generally death. It is a function of the consequence, the frequency of occurrence of the accident being considered, and the probability that the individual will be affected. For example, this risk makes it possible to know the risk to an individual of death during a year as a result of a nearby industrial accident, if that individual remains in the same place all year. The individual risk is expressed in the form of risk isocontours and, in the case of this project, each contour corresponds to a compilation of results from the 133 accident scenarios chosen by the proponent (MDDEP, 2002b, p. 20; PR3.1, p. 9-72; PR5.1, QC-125, p. 1).

According to the proponent, the elements contributing the most to individual risk are associated with the terminal processing zone, which would generate 84% of total risk. The rest is associated with related accident scenarios, as well as accident scenarios involving LNG tankers or LNG unloading and storing equipment (PR3.1, p. 9-74).

As illustrated in Figure 8, the individual risk results show that the contour 10^{-4} (one death in 10,000 years) is on the processing zone[1] and is located entirely within the terminal limits. The contour 10^{-5} (one death in 100,000 years) reaches the cliff located to the east. The contour 10^{-6} (one death in a million years) reaches south towards the port entrance. The centre of Cacouna village is 780 m away and beyond the contour 10^{-7} (one death in 10 million years). The nearest cottage is located 300 m beyond that contour, and highway 132 is about 800 m beyond. Past 800 m, the proponent concludes that the accumulated probability of death of a person is under one in 10 million. However, the August 2006 modifications could change those isocontours to some extent.

- *Finding – The Panel found that, according to the proponent's results, the most vulnerable individuals would be the LNG terminal workers who would be exposed to a probability of one death in 10,000 years. People using the trails on the Gros Cacouna peninsula and the Cacouna marsh and workers in the Port of Gros-Cacouna would be exposed to an individual risk somewhere between a probability one death in*

1. The processing zone includes the operation facilities and related piping for LNG and natural gas reception, transportation, and processing, including the nitrogen plant.

100,000 years and one in 1,000,000 years. Residents in the Cacouna village center would be exposed to a probability of death under on per 10 million years.

Acceptability criteria for individual risk

According to the proponent, the criteria of the Major Industrial Accidents Council of Canada (MIACC), also used by the MDDEP, are recognized internationally, particularly by the Environment Department of Holland, the *Health Safety Executive* (HSE) in the United Kingdom, and in California (Mr. Yves Rochon, DT4, p. 39).

Under these criteria, beyond the limit of a risk level corresponding to one incident every 10,000 years, establishment of parks and industries is allowed. Beyond the isocontour of one event in 100,000 years, business, offices, and low density housing is allowed. Beyond risk levels that are under one event in a million years, it is possible to find all other land uses including schools, hospitals, and high-density housing. The limit of one accident in ten million years corresponds to the contour for risk deemed to be negligible (DA23).

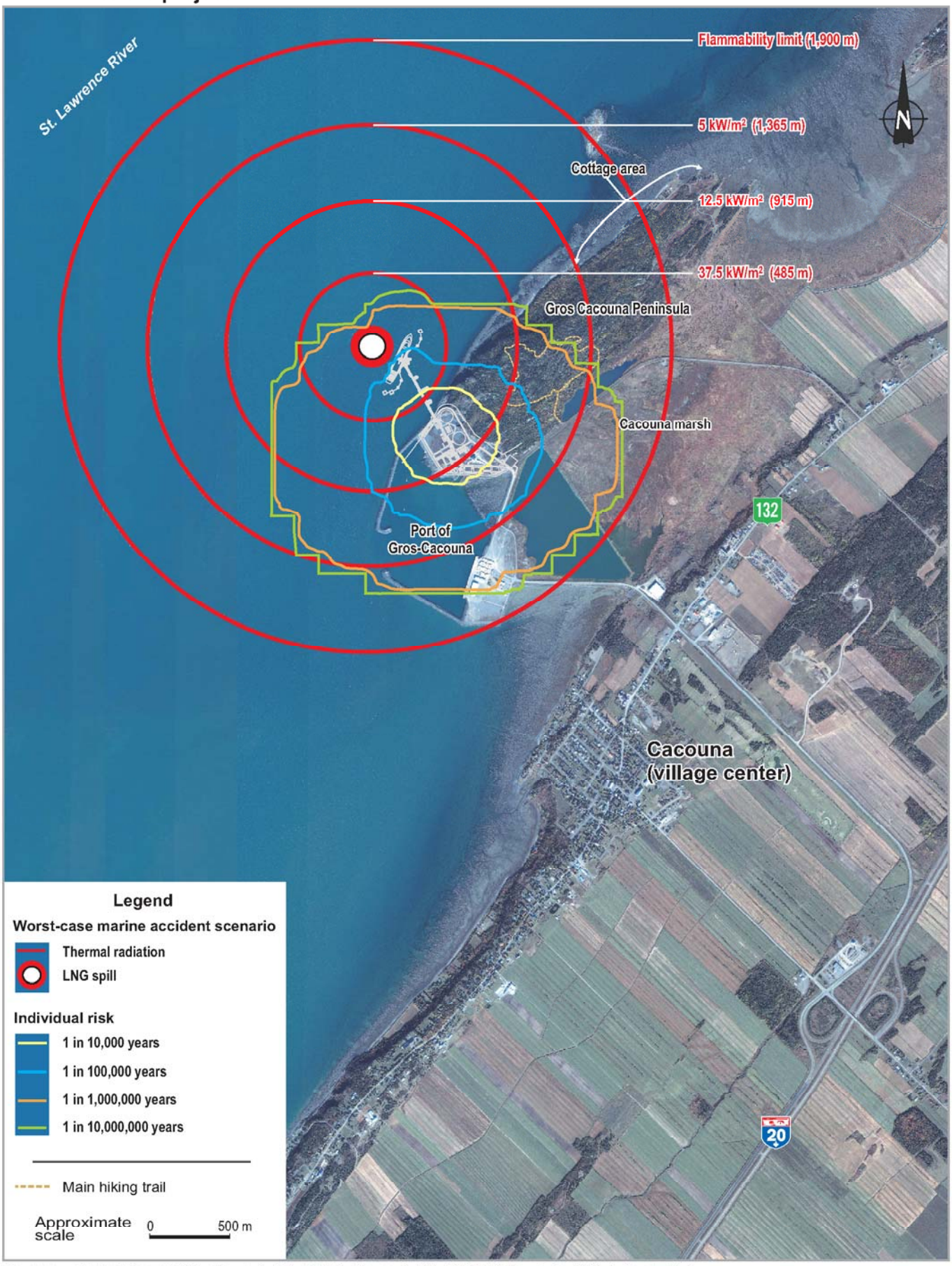
The proponent pointed out that the acceptability criteria it used were minimum return periods of 1,000 years for workers and 10,000 years for the public located outside the site. The maximum individual risk from the project, outside the proposed terminal limits, would be one event in 33,000 years, thus acceptable for the proponent (PR3.1, p. 9-73 and 9-78).

- *Finding – The Panel found that, under the risk acceptability criteria of the Major Industrial Accidents Council of Canada, the risk generated by the LNG terminal project would respect use of the land.*

Societal risk

Societal risk is the relationship between the frequency of occurrence of an accident and the number of people subject to the impact of the accident (usually death) in a given population. It is complex to calculate and requires that the land use be known as well as population movements so that the profile of the exposed population can be established. Societal risk is expressed in the form of an “FN-curve” which represents the probability of a fixed number of deaths. This type of risk provides information as to the probability that an accident at the LNG terminal will take place in the course of a year and cause death to more than one person (PR3.1, p. 9-20 et 9-75; MDDEP, 2002b, p. 21).

Figure 8 Consequences of worst-case marine accident scenario and individual risk related to the project



Sources : adapted from PR3.1, Figure 9.4-6 ; PR5.1, Figure 9.4-2 ; DA46.2, Figure 6 ; DQ1.1, Appendix 1.

According to the proponent the FN-curve associated with the project indicates that certain events can cause multiple deaths. For example, events causing two or more casualties could occur once every 5,000 years. Events that cause 37 casualties could occur once every 80 million years. The main elements that could cause death would be linked to the terminal processing area, the storage tank area, and the LNG tanker docking area. The LNG tanker crews and terminal workers would be among the most at risk. As for the frequency of deaths in the area of the trails adjacent to the terminal, it is about one in ten million years and would correspond to about 11 deaths. For the annual frequency range covered by the FN-curve, no deaths would occur in the heart of the Cacouna village or in the Gros-Cacouna harbour. Here again, the August 2006 modifications could slightly change the shape of this curve (PR3.1, p. 9-76).

- *Finding – The Panel found that, according to the proponent, the groups who are most at risk are the LNG tanker crews and the LNG terminal workers. The rise would drop in the area of the trails adjacent to the terminal and would be considered negligible in the inhabited areas of the municipality of Cacouna.*

Risks for wildlife

Although the probability is low, a marine accident followed by an LNG leak could have impacts on the terrestrial and marine wildlife. Birds could suffer from cryogenic burns, be asphyxiated, or be exposed to thermal radiation. The species affected would vary depending on the season and the time of day, and the consequences of this type of spill would be even more significant if the accident occurred during a major gathering period. A species that would be particularly exposed would be the Black Guillemot, which nests near the planned jetty.

The proponent considers that an LNG leak would have very little impact on marine mammals. They advance the hypothesis that whales and seals could easily withstand an abrupt drop in air or water temperature because of the layer of fat and fur that insulates them. On the other hand, Fisheries and Oceans Canada considers that marine mammals in the area of the cloud of natural gas could suffocate. Moreover, sudden expansion of LNG could cause an explosion, without igniting, and injure marine mammals nearby. In addition, Fisheries and Oceans Canada points out that contact with LNG floating on water or with the burning cloud of natural gas could cause burns. It is very unlikely that marine mammals near the spill site would be able to detect the periphery of the LNG layer and get away from it (DQ7.1-1, p. 3; PR3.1, p. 9-81; DQ7.1.1, p. 3).

Combustion of LNG spilled by an LNG tanker could also set fire to the 2.3 ha forest zone located on the Gros Cacouna peninsula. In addition, the colony of

Black-crowned Night Heron, located about 150 m from the project, could be affected by this type of fire (DB39, p. 3; PR3.1, p. 9-82 to 9-85).

Concerning the land accident scenarios, the proponent considers that the mammals and birds that would not have left the impact area could be affected by an LNG spill, a cloud of natural gas, or a fire.

- *Finding – The Panel found that in case of a liquefied natural gas spill, whether it is on the water or on land, the consequences on marine or terrestrial wildlife present in the area could be considerable, although the probability of such an event occurring is very low.*

Security of facilities

During the public hearing, several participants expressed fears about a terrorist act against the LNG terminal. On this point, Natural Resources Canada mentioned that:

> […] the proponent's risk assessment considers only accidental LNG leaks. It does not consider the possibility of a deliberate attack on an LNG tanker. The probability of a deliberate attack is considered negligible. This omission could be serious, since the consequences of a deliberate attack could be more serious than an accidental leak. The probability and the consequences of a deliberate attack should be assessed by the security personnel […].
> (DB21, p. 7 et 8)

The proponent asserted in the public hearings that, considering that no attack on LNG facilities or on LNG tankers had occurred until now and that these facilities would not be a strategic enough target to be attractive to terrorists, they considered that the probability of such an event appeared to be low. However, they mentioned that the possibility of a deliberate act had been taken into account in the development of a security plan required by Transport Canada under the *Marine Transportation Security Act* (C.S. 1994, c. 40) (Mr. John Van Der Put, DT7, p. 21).

Transport Canada explained in the public hearings that any facility involved in international business has to produce a risk and vulnerability analysis and an analysis of threats, and submit a security plan that includes measures such as fences, surveillance, and security guard services. Transport Canada then issues a certificate of compliance and oversees the implementation of the secuity measures. Transport Canada has the power to refuse the entry of a ship into Canada, to expel it, or to detain it, and it can withdraw a facility's certificate of compliance and thereby taking away the facility's right to receive international ships (Mr. Daniel Morin, DT5, p. 95).

According to Transport Canada, the proponent's preliminary security plan meets the requirements of the Marine Transportation Security Regulations and the proponent could thus obtain his certificate of compliance. The Panel did not request to consult the security plan, which is confidential. It nonetheless asked questions of Transport Canada and the proponent regarding the requirements of this plan to check the possibility of environmental impacts that had not been raised, and to ensure that it would not require modifications to the project after the public review.

- *Finding – The Panel found that the preliminary security plan filed by the proponent to Transport Canada and its content were judged to be satisfactory by that department.*

Emergency measures planning

The proponent drafted and publicly filed a preliminary emergency measures plan in which the different accident scenarios are presented. This plan would be in effect during construction and operation of the LNG terminal. It would be revised at least once a year and a copy would be given to the Municipality of Cacouna, the City of Rivière-du-Loup, and also to the Sûreté du Québec and the Agence de la santé et des services sociaux du Bas-Saint-Laurent. The MDDEP confirmed that the level of information in the plan had been validated by the ministère de la Sécurité publique (Quebec Ministry of Public Security), and that at this stage of the project its content complies with regulation (Mr. John Van Der Put, DT2, p. 39; DA1, p. 1-5; Mr. Yves Rochon, DT7, p. 13).

Transport Canada is also satisfied with the preliminary plan filed by the proponent. It added that it would ensure the plan is in line with the emergency planning guide for the Port of Gros-Cacouna and the LNG tanker emergency plan, which is required by international agreements. According to Transport Canada, the proponent would have to conduct an exercise based on the emergency plan before the terminal is commissioned (DB38, p. 7).

- *Finding – The Panel found that, according to the Ministry of Sustainable Development, Environment and Parks and the Quebec Ministry of Public Security, the proponent's preliminary emergency measures plan is satisfactory. It notes that Transport Canada shares the same opinion and that it would take measures to bring this plan in line with that of the Port of Gros-Cacouna as well as with the emergency measures plan linked to the LNG tankers.*

The joint municipal/industry committee

A joint municipal/industry committee would be set up by the proponent, in consultation with the main local stakeholders, to complete the preliminary emergency measures

plan. An emergency plan would then be defined based on accident scenarios judged to be plausible (Mr. Carl Lussier, DT3, p. 75).

It should be remembered that operation of the terminal could have repercussions for the Port of Gros-Cacouna, and Natural Resources Canada made recommendations concerning the accident scenarios to be considered. The proponent has proposed that the port authorities be part of the joint committee and Transport Canada confirmed its participation (Mr. Carl Lussier, DT3, p. 75; DB38, p. 4; DB21, p. 8). As a result, the Panel notes that Transport Canada will have the opportunity to present its concerns, as well as the conclusions of Natural Resources Canada's assessment, to this committee.

Some participants expressed concerns in the public hearings regarding the limited resources they have to deal with a possible accident. A representative of the Centre de santé et de services sociaux de Rivière-du-Loup was concerned by the fact that the Centre had not been consulted in the drafting of the emergency measures plan. He mentioned that the Centre would not be in a position to receive many injured people suffering from serious burns at the same time. For that reason, the proponent undertook to have a representative of the Centre sit on the joint committee (Messrs Normand Gervais and Carl Lussier DT5, p. 36 and 43).

The Mayor of Notre-Dame-des-Sept-Douleurs also emphasized that his municipality would not be able to deal with an LNG tanker accident since it is isolated and has very limited resources. Even though the proponent considers that the probability of such an incident is low, the residents of île Verte, particularly those living on Bout d'en Haut point, would be near the LNG tanker route. The proponent proposed to include the municipality in the joint committee (Messrs Gilbert Delage and Carl Lussier, DT5, p. 12 and 13).

- *Finding – The Panel found that the proponent has undertaken to establish a joint municipal/industry committee through which a specific planning of emergency measures would be developed with the main government stakeholders, particularly Transport Canada, le Centre de santé et de services sociaux de Rivière-du-Loup and the municipality of Notre-Dame-des-Sept-Douleurs.*

Risks of accident

It should be remembered that, in the event of a major marine accident, the workers at the LNG terminal and the Port of Gros-Cacouna, residents of cottages located near the terminal or in the centre of the village of Cacouna, hikers using the Cacouna marsh and the nearby peninsula, kayakers and recreational boaters would be affected. Although the probability of an accident is low, certain municipalities along the

river, such as Notre-Dame-des-Sept-Douleurs or even Les Escoumins, could find themselves faced with such an event (DQ1.4.1, BAPE-2.2).

According to an assessment conducted for public hearing participants, the consequences of an LNG spill from an LNG tanker could be more serious than those from the worst case scenario assessed by the proponent. Even if such an event would likely be rare, it makes it clear for the Panel that the emergency measures plan must foresee measures to ensure the safety of people who could be affected in the case of an accident involving the terminal or an LNG tanker.

The proponent's preliminary emergency measures plan foresees that information would be distributed to people who could possibly be affected to explain what to do to protect themselves. The proponent also wishes to have help from the joint municipal/industry committee. It intends to install alarm systems or equivalent means to warn workers and people who potentially could be exposed. The proponent mentioned that two warning levels would be necessary, one for the LNG terminal and the other for the trails on the Gros Cacouna peninsula and the Municipality of Cacouna (DA1, p. 9-1).

- ***Recommendation 30 –*** *The Panel recommends that, in addition to the warning systems planned for the Gros Cacouna peninsula trails and the municipality of Cacouna, the proponent establish a place for workers at the Port of Gros-Cacouna. In addition, warning systems established in cooperation with the municipal authorities of Notre-Dame-des-Sept-Douleurs and Les Escoumins should be planned.*

- ***Recommendation 31 –*** *The Panel recommends that the proponent implement an annual public information mechanism for people who could be affected by a technological accident at the LNG terminal or on an LNG tanker.*

Fire protection

Although the proponent plans to be self-sufficient with respect to fire protection at the LNG terminal, it could have recourse to the Cacouna Fire Department in a serious situation. If the municipality needs additional coverage, the cost would be billed in the form of taxes that had been agreed upon with the proponent over a period of forty years. The proponent also plans to cover the costs, as required, for training front line responders. The matters where training or additional material are required would be addressed in discussions of the joint committee (Messrs Jacques M. Michaud and Carl Lussier, DT3, p. 80 and 81; PR5.1, QC-094 and QC-134; DQ1.1.1, BAPE-2.13).

The MDDEP is of the opinion that an event involving an LNG fire presents few problems from an environmental standpoint, since this type of fire would not require

any particular management by the MDDEP or by the Quebec Ministry of Public Security. However, products used to fight the fire, such as foam, could be more problematic. If government approves the project, the proponent would have to specify how it would eliminate these foams after a fire at the time of issuance of the work authorization certificate under Section 22 of the *Environment Quality Act* (DQ23.1).

Seismic activity

It should be remembered that, under the requirement of standard CSA-Z276-01, the proponent must design the facilities so that they can resist an earthquake with a 475-year return period and still allow operations to proceed as usual. The proponent mentioned that the emergency measures plan would take into account the consequences of an earthquake of a magnitude greater than the one used in the design criteria. On the other hand, the proponent stated in public hearings that it would not activate its emergency measures plan when there was a major earthquake unless an LNG leak was detected (PR8.7, C-027, Q-183; Mr. Carl Lussier, DT4, p. 58).

- ***Recommendation 32 –*** *The Panel recommends that in case of an earthquake of a magnitude above or equal to the return period of 475 years, the emergency measures plan should be activated so that the authorities responsible for civil safety, at the municipal and provincial levels, are informed of the status of the situation, even if there is no liquefied natural gas leak.*

Environmental emergencies

The LNG terminal would be subject to the *Environmental Emergency Regulations* (DORS/2003-307) under the *Canadian Environmental Protection Act*. The proponent would, therefore, have to file with Environment Canada a notice of information on the dangerous substances present that exceed threshold quantities. According to the list of inflammable or dangerous substances, only LNG would be subject to the Regulations. What is more, the proponent would have to develop and implement an efficient environmental emergency plan that would include sections linked to prevention, preparation, and rapid intervention as well as restoration. This plan would also have to foresee possible consequences of an environmental emergency on the environment and on human health (Natural Resources Canada, 2005b, p. 3)[1].

- ***Recommendation 33 –*** *Since Transport Canada is owner of the Gros-Cacouna Harbour facilities, the Panel recommends that that department should ensure that an emergency environmental plan is prepared for the LNG terminal project in accordance with the* Environmental Emergency Regulations*.*

1. [On line (July 31, 2006): www.ec.gc.ca/RegistreLCPE/guidelines/impl_guid/x3.cfm]

Chapter 7 Environmental monitoring and follow-up

The proponent plans to implement a monitoring program during construction and a follow-up program during operation of the terminal. In this chapter, the Panel analyses the measures proposed and discusses the closing and dismantling of the LNG terminal.

Construction monitoring

The monitoring program for the proponent's different environmental requirements would identify those responsible, define the objectives and methods, and establish the mitigation measures. During construction, other than monitoring, the proponent has no plans for a specific environment management system (PR3.1, Chap. 10).

Mitigation measures are planned during construction for various aspects and the proponent has committed to ensure the measures are effective, to make the necessary adjustments, and periodically to report to the MDDEP. The proponent stated that the details of the monitoring program would only be determined once the contractors are selected. Only then would the measures to be put in place for mitigating impacts be confirmed (PR5.1, QC-142; PR8.7.1, Q2-08).

- ***Recommendation 34 –*** *The Panel recommends that the monitoring program be developed by the proponent as part of the environmental assessment of the project.*

During construction, several adverse effects are expected, such as noise, risk of accident, and atmospheric emissions. Participants in the public hearings expressed several concerns about these matters. The proponent undertook to establish a telephone hotline for the public (PR5-1, QC-139). In addition, it undertook to make the monitoring results public on its web site. "A liaison committee comprising community representatives and senior managers from Cacouna Energy" would be established at the beginning of construction work (Mr. Carl Lussier, DT1, p. 68).

- ***Recommendation 35 –*** *The Panel recommends that a public advisory committee be established to respond to the concerns of the public. This committee would comprise citizens, the proponent, a representative of the municipality of Cacouna, a representative of the Government of Canada, and a representative of the Government of Quebec, and that it be financed by the proponent for the duration of the construction work. The results of monitoring should be public.*

Environmental follow-up during operations

The proponent plans a follow-up program during operations. The proposed measures focus specifically on ambient noise, terrestrial wildlife, and marine mammals. The proponent proposes to end the follow-up program as soon as it is shown that the mitigation measures are effective or that there are no impacts. The proponent would determine the appropriate time to end the follow-up activities (PR3.1, Table 10.3-1; PR3-1, p. 10-12).

- ***Opinion 36 –*** *The Panel is of the opinion that the concerned government authorities, and not the proponent, are responsible for deciding on the necessity of continuing environmental follow-up or not.*

The proponent undertook to work towards the implementation of socially oriented programs such as: development of the marsh and the bird watching site; establishment of a communication and information system for recreational boaters and kayakers, and a working committee for their safety; development of port activities; and the creation of a working committee, together with the Centre local de développement pour la formation de la main-d'œuvre. However, the proponent did not plan any particular follow-up associated with the social impacts of the project (DA5, Chap. 4).

- ***Recommendation 36 –*** *The Panel recommends that the proponent, in partnership with the Centre local de développement de la région de Rivière-du-Loup, participate in the assessment of the regional economic spinoffs of the project.*

The proponent intends to implement a documented management system for health, safety, and environmental protection measures that would be based on the standard ISO-14001 (PR5.1, QC-140). However, the environmental aspects likely to have significant environmental impacts would not be determined by the proponent until the beginning of operations. The Panel believes that an environmental management system based on the standard ISO-14001 could, however, facilitate follow-up on the environmental effects that could occur during operations and help mitigate them.

- ***Recommendation 37 –*** *The Panel recommends that the public advisory committee be maintained during operations. The monitoring results would be available to the public.*

Decommissioning the site and the terminal

The LNG terminal is expected to operate for 40 to 50 years. The proponent stated that it cannot deal with decommissioning in detail since it is not known at this time what the conditions for decommissioning would be. In addition, even though it commits to

keep the site free of contamination and plans to clean up after the work is completed, the proponent did not specify how it would go about restoring the land (DQ1.3, BAPE-12.1; PR3.1, p. 2-89 and 4-36; PR8.6, Appendix 1).

Transport Canada and the proponent are currently negotiating the terms of a lease for an area of approximately 175 000 m^2 on Port of Gros-Cacouna lands. A decommissioning period would be planned during the last two or three years of the lease, and the lessee would have to produce an environmental assessment to comply with the *Canadian Environmental Assessment Act* before decommissioning activities are undertaken. The proponent would have to meet all the conditions and obligations necessary to restore the site. The costs of decommissioning would be borne by the proponent. The dismantling would have to be done to the satisfaction of Transport Canada, which would require that the lease contain provisions protecting the Crown in case of events or situations that could result in liability, be that financial or other, particularly as regards soil contamination, transfer of the lease to another entity, consequences of a catastrophe, as well as the insolvency or bankruptcy of the lessee. The proponent therefore plans that, at the end of the project's useful life, the facilities that are not being used would be closed down in compliance with the obligations contained in the lease and the applicable regulatory requirements regarding decommissioning and site rehabilitation (DQ1.3, BAPE-12.1 and BAPE-12.2; DQ6-1, p. 1; DB38, p. 8; DQ1.3, BAPE-12.1).

Cacouna Energy is a partnership to be established for the design, construction and operation of an LNG terminal at Gros-Cacouna. It would be a limited partnership responsible, from a legal standpoint, for all obligations that would be granted to it. In case of bankruptcy or insolvency the limited partners, Petro-Canada and TransCanada PipeLines Limited, would assume the obligations of Cacouna Energy (Mr. John Van Der Put, DT2, p. 54; DQ1.3, BAPE-12.4).

- ***Recommendation 38 –*** *The Panel recommends that the proponent complete the analysis of the environmental impacts of dismantling the terminal based on the terms of the lease reached with Transport Canada, as part of this environmental assessment.*

- ***Recommendation 39 –*** *The Panel recommends that Transport Canada require that the proponent's lease contain a guarantee that the harbour lands used for construction would be rehabilitated as soon as construction of the LNG terminal is completed.*

Conclusion

The Panel understands that construction of the Cacouna Energy LNG terminal by TransCanada PipeLines Limited and Petro-Canada aims to satisfy part of the anticipated natural gas demand in Quebec, Ontario, and in the north-eastern United States. The project represents a business opportunity in the natural gas sector, in which prices have been relatively high for several years in North America.

The Panel emphasizes the likelihood that conventional production of natural gas in North America will reach a ceiling in the coming years, as development of the geological basins now in production reaches maturity. Development of this project, coupled with other natural gas projects, would contribute to maintaining, or even slightly increasing, the proportion of the energy market served by natural gas as compared to other fossil fuels known to emit more greenhouse gases. The Panel notes that the liquefaction and regasification of natural gas requires a significant amount of energy, thereby making liquefied natural gas a little less advantageous than natural gas brought from Western Canada by pipeline.

Furthermore, the future of natural gas as a fuel in Canada appears to be in part linked to the will of governments to promote so-called “alternative” energy sources that produce less greenhouse gases than fuel oil and coal.

The Panel is of the opinion that an LNG terminal in Quebec would contribute to making natural gas somewhat more competitive in comparison with other sources of energy, and that an LNG terminal would improve the security of natural gas supply in Quebec in the event of a breakdown in the transportation system coming from the West. However, Quebec is part of an integrated market. Supply shortages would result in a continental increase in the price of this fuel.

Development of the project would have major regional economic effects during construction. These effects would be more modest during operation of the LNG terminal, with 70 direct and indirect jobs. The proponent’s undertaking to pay annual municipal and school taxes of some $6 million would represent a significant contribution to the Municipality of Cacouna and the concerned school boards.

Even if the project were to be approved, the Panel notes that the liquefied natural gas supply is not yet ensured, since discussions are still underway between Petro-Canada and Gazprom to build natural gas liquefaction facilities in Russia. Furthermore, the project still has no outlet to the North American market since the pipeline route has not yet been defined.

The pipeline has already raised concerns from participants in the current review process in relation to expropriation, forest clearing, loss of agricultural land, and technological risks. Since assessment of the pipeline was not included in its mandate, the Panel did not address the potential benefits that would result from an increase in natural gas supply to the Rivière-du-Loup region, nor the impacts of that project. Another panel will be responsible for conducting an appropriate review.

The Panel reiterates, nevertheless, a position expressed by other BAPE commissions, namely that an essential ancillary project such as the gas pipeline should be reviewed at the same time as the main project, in this case the LNG terminal. Therefore, in the case of a positive decision on the LNG terminal, the Panel believes that government approvals to begin work on the project should be contingent upon a public environmental assessment and government approval of the gas pipeline project. In addition, the Panel recommends that the proponent present as soon as possible, within the context of the current environmental assessment process, the pipeline route options and an environmental impact assessment for the Port of Gros-Cacouna property that belongs to Transport Canada. This would enable Transport Canada and Environment Canada, which owns adjacent land to the east of the harbour, to define an acceptable route in accordance with their respective areas of concern.

The LNG terminal would be built on federal land zoned for industry, but it is located at the interface with an area that has both heritage and recreational tourist values, as well as a natural coastal environment with a high level of marine and terrestrial biodiversity. The addition of this major industrial infrastructure would confirm the industrial role of the Municipality of Cacouna, but would result in significant changes to its village character, especially from the standpoint of the landscape, and could impede local development of tourism and vacationing.

The Panel notes that no major industrial facility exists at Cacouna, even though the deep water harbour was developed forty years ago and it is located next to the second largest industrial park in Quebec. Over the past twenty-five years, several industrial projects have been considered, including an LNG terminal. The Panel recognizes the industrial orientation given to the Municipality of Cacouna more than forty years ago, with the support of part of the population, but considers it entirely legitimate for residents to desire development to occur incrementally, while looking for ways to benefit from the existing attractions. The Panel also understands the fear that even the possibility of a major industrial project may continue to impede their projects or cause residents to live in uncertainty. In the Panel’s view, the Municipality is at a crossroads and a negative decision on the project by government authorities or the proponent would launch the debate on the municipality’s future once again.

The Panel will now address more specifically the possible development of an LNG terminal project which is based on a plan for only two storage tanks. The Panel is of the opinion that the site should be developed so as to minimize the environmental impacts of the project on the surrounding environment, including the visual environment. The Panel considers that the solution retained for the management of the dredged material should not cause nuisance or security problems for the neighbouring population. The Panel also considers that the overlooking cliff should be spared from blasting, and that blasting should be limited to removing rocky outcroppings to level the land. This would reduce the disruptions caused by noise during construction. In this regard, the Panel maintains that the construction period cannot be viewed as short for the population, and recommends that work likely to be noisy should only be allowed during the day so as to reduce the noise impact on the population to acceptable levels.

Mitigation measures are proposed by the proponent or government authorities. Implementation of these measures by the proponent, along with appropriate follow-up and monitoring by government authorities, is expected to reduce the significance of the environmental effects to acceptable levels. On the other hand, some measures, such as those to mitigate noise or protect birdlife, will require careful follow-up and, when necessary, additional measures. Furthermore, the Panel is proposing mitigation measures and follow-up, which, if applied, should reduce these effects to acceptable levels, except possibly for the Black Guillemot and the Black-crowned Night Heron, for which uncertainty remains regarding the effects of the project. For the Peregrine Falcon, the proponent should propose mitigation measures and follow-up to ensure the sustainability of its nesting area at the project environmental assessment stage.

The presence of a marine safety perimeter would force kayakers to go around the berthing wharf and possibly to remain 300 m away when an LNG tanker is docked. The Panel is of the opinion that the proponent, the “Fédération québécoise du canot et du kayak”, and the organization “Route bleue du sud de l’estuaire” should agree on measures to ensure kayaker safety, and to compensate for a possible drop in the use of the Cacouna and île Verte sectors as a result of the project. The berthing wharf could also be an obstacle for boats used for emergency evacuation of people from île Verte. Therefore, the Panel is of the opinion that the proponent should provide the Comité de santé de l’île Verte (île Verte Health Committee) with a means to get around the wharf safely.

The worst-case land accident scenarios considered by the proponent would have no consequences for people located outside the limits of the LNG terminal. The technical revision of the project by the proponent and Panel recommendations are likely to modify the assessment of the technical risks. The Panel recommends that the

proponent update the assessment of the technical risks and submit it to Transport Canada and the Ministry of Sustainable Development, Environment and Parks as part of this environmental assessment. However, given the risks due to the proximity of the Charlevoix region, which is known for its high seismic activity, the Panel recommends that a government authority be charged with ensuring that this risk is taken into account in LNG terminal design and construction specifications at the environmental assessment stage. Moreover, the proponent should consider a more powerful seism for safely stopping LNG terminal activities, as required by Natural Resources Canada.

The risks raised by LNG tankers are addressed by Transport Canada as part of the Technical Assessment Process for Marine Terminals and Transhipment Sites (TERMPOL), for which the report is scheduled for the autumn of 2006, after the Panel's review. The Panel recommends that Transport Canada take into account all the impacts of LNG tanker traffic before deciding whether they should travel south or north of île Rouge. The Panel believes it was useful for Transport Canada to follow-up the Panel activities in order to incorporate the concerns of the public and the Panel in its analysis of the safety and security of the facilities.

An opinion from a risk analysis specialist mentions the possibility that the consequences of a liquefied natural gas spill from an LNG tanker would be more serious than those considered in the worst case accident scenario assessed by the proponent. For the Panel, even though such an event is truly rare, the proponent's emergency response plan should ensure the safety of harbour workers, people in the vicinity of the LNG terminal, and communities near the LNG tanker routes, such as île Verte or Les Escoumins. It thus appears essential that an information mechanism be set up to inform people who could be affected by aspects of the plan and advise them of the risks. The Panel also points out that a liquefied natural gas spill would have consequences for wildlife in the area unless specific mitigation measures are put in place.

The Panel found that the proponent, despite his initiatives, was not able to identify the concerns of the Malécites de Viger First Nation regarding the project, nor propose measures to mitigate possible impacts. The project is not, however, expected to result in a loss of access for the current practice of traditional activities, though it could impact a tourism project planned by the community. Therefore, the Panel recommends that Transport Canada pursue initiatives with the Maliseet Nation so as to take its concerns into account. Should the authenticity of the rock paintings discovered in the cave near the shore on the Gros Cacouna peninsula be demonstrated, the Panel recommends that Environment Canada ensure that they are not damaged by blasting.

The Panel is of the opinion that the proponent should demonstrate to Fisheries and Oceans Canada and to the Ministry of Natural Resources and Wildlife, within the current environmental assessment, that the mitigation measures for preventing the entrainment of larvae and juveniles during construction of the LNG terminal and by LNG tankers will be effective. The same applies for the compensation for loss of fish habitat under the *Fisheries Act*.

The work associated with the berthing wharf and the jetty would cause a local increase in underwater noise off shore from Cacouna, an area considered a critical habitat for female beluga whales and their young. Fisheries and Oceans Canada has reviewed the new construction method for the berthing wharf and jetty, as proposed by the proponent in August 2006, and considers it acceptable under certain conditions. The Panel is not convinced that this method is beneficial compared to the original approach, and recommends to Fisheries and Oceans Canada that it ensure the mitigation measures required of the proponent are effective, or that it propose new mitigation measures.

The Panel identified the atmospheric emissions from the project during the construction and operation phases, as well as the ambient noise during the construction phase, as the two main elements likely to cause significant cumulative effects and impacts on the population and on wildlife.

Moreover, the passage of LNG tankers between Les Escoumins and the Port of Gros-Cacouna, though at reduced speed would increase marine traffic significantly. The reduced tanker speed would decrease the likelihood of collisions with marine mammals. However, the lack of scientific studies, especially on marine noise resulting from navigation in general in the St. Lawrence estuary and in the Gulf, prevents the Panel from reaching a conclusion with respect to the existence of cumulative effects on beluga populations in this sector as a result of the LNG tanker traffic. In this regard, the Panel encourages Fisheries and Oceans Canada to pursue research on the effects of navigation on the St. Lawrence belugas. The Panel is of the opinion that the possible disturbance of beluga whales during their most vulnerable period justifies having the LNG tankers go north of île Rouge from mid-June to mid-September when travelling between Les Escoumins and Cacouna. This measure would also reassure île Verte residents because the LNG tankers would be farther away.

The Panel notes that the proponent has committed to implement the mitigation measures proposed in its environmental impact statement and during the public hearings. In consideration of the Panel's responsibilities under the *Canadian*

Environmental Assessment Act and its mandate, and subject to the points of uncertainty identified, the Panel concludes that the project is not likely to cause significant adverse environmental effects if the proponent implements the mitigation measures and recommendations made by the Panel.

Executed at Quebec,

BAPE Panel	Joint Review Panel
Michel Germain, Chairman	Michel Germain, Chairman
John Haemmerli, Panel member	Jean-Thomas Bernard, Panel member
	John Haemmerli, Panel member

Contributors to the writing of the report:
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In collaboration with:
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Appendix 1

Information about mandates

Applicants to hearing

Mr. Guy Beaulieu

Ms. Chantal Bélanger

Ms. Lucille Bouchard

Ms. Josée Boudreau

Ms. Lynda Dionne
Mr. Georges Pelletier

Mr. Michel Dionne

Mr. Alexandre Émond-Paradis
Ms. Brigitte Émond
Mr. Bruno Paradis
Mr. William Émond-Paradis

Mr. Réal Gagnon
Ms. Bérangère Roy

Mr. Gaston Hervieux

Ms. Élise Marquis

Mr. Gérard Michaud

Mr. Gilles Nadeau

Ms. Catherine Pelletier

Mr. Germain Saint-Onge

Mr. Bruno Vincent

Association québécoise de lutte contre la pollution atmosphérique,
Mr. André Bélisle

Comité de recherche et d'intervention environnementale du Grand-Portage inc.,
Mr. Gaëtan Malenfant

Comité ZIP du sud de l'estuaire,
Ms. Françoise Bruaux

Conseil central du Bas-Saint-Laurent,
Ms. Raymonde Robinson

Conseil régional de l'environnement du Bas-Saint-Laurent,
Mr. Éric Bélanger

Corporation des propriétaires de l'île Verte pour la conservation de l'île Verte,
Ms. Danielle Pitre

Les Amis de la vallée du Saint-Laurent,
Mr. André Stainier

Mouvement Au Courant,
Mr. John Burcombe

Municipalité de Notre-Dame-des-Sept-Douleurs,
Ms. Anaïs Giroux-Bertrand

Nature Québec/UQCN,
Mr. Charles-Antoine Drolet

Regroupement national des conseils régionaux de l'environnement du Québec,
Mr. Guy Lessard

Société de conservation de la baie de l'Isle-Verte,
Mr. Patrice Noël

TransCanada PipeLines Limited,
Mr. John Van Der Put

Vision Cacouna inc.,
Mr. Claude Gaumond

Mandates

The BAPE was mandated under the *Environment Quality Act* (R.S.Q., c. Q-2) to hold a public hearing and to report its findings and analysis to the Minister of Sustainable Development, Environment and Parks.

The Joint Review Panel was mandated, in accordance with the May 2004 Canada-Quebec Cooperation Agreement on Environmental Assessment, to conduct a public review of the project in a manner which respects the requirements of the *Canadian Environmental Assessment Act* (1992, c. 37) and the *Environment Quality Act*.

The Panel and its team

BAPE Commission

Michel Germain, Chair
John Haemmerli, Member

Joint Review Panel

Michel Germain, Chair
Jean-Thomas Bernard, Member
John Haemmerli, Member

The team

Marie Anctil, Secretariat Officer
Jean-Sébastien Fillion, Communication Officer
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Monique Gélinas, Panel Secretariat Coordinator
Maryse Pineau, Panel Panager (Joint Review Panel)
Suzie Roy, Analyst
Linda St-Michel, Analyst

With the collaboration of:
Bernard Desrochers, Computer Graphics Coordinator
Hélène Marchand, Editor

Public hearing

Preparatory meetings

April 24, 2006	Preparatory meetings held in Cacouna
April 26, 2006	Preparatory meetings held in Quebec City

1st part	2nd part
May 8 to 11, 2006 Hôtel Universel Rivière-du-Loup	June 12 to 15, 2006 Community Center Cacouna

Site visit

May 10, 2006

The proponents

TransCanada PipeLines Limited	Mr. John Van Der Put, porte-parole Mr. Joel Forrest Ms. Christine Guy Ms. Sonia Lefebvre Mr. Wolfgang Neuhoff Ms. Véronique Robichaud Mr. Ken Taylor
Petro-Canada	Mr. Carl Lussier Ms. Emmanuelle Dubois Ms. Rachel Kolber

Their consultants

Corporation des pilotes du Bas-Saint-Laurent	Mr. Jean Fortier
Det Norske Veritas	Mr. Ernst Meyer

Golder and Associates	Mr. Éric Bergeron Mr. Mario Cantin Ms. Teresa Drew Ms. Nathalie Gaudreau Mr. Simon Marcotte Ms. Geneviève Pomerleau
PESCA environnement	Ms. Marjolaine Castonguay
Sandwell Engineering Inc.	Mr. Jorgitso Tseng
SofreGaz	Mr. Jacques Trollux
Université du Québec in Rimouski	Mr. Vladimir Koutitonsky
Wilkinson and Associates	Mr. Paul Wilkinson
Translators	Ms. Carmen Figueroa Sotelo Mr. Alain Kalfon

Resource Persons

Mr. Jacques Grondin	Canadian Environmental Assessment Agency
Mr. Louis Breton, Spokesperson Mr. Serge Labonté Mr. Marc Provencher Mr. Jean-François Rail Mr. François Schaffer	Environment Canada
Mr. René Gagnon, Spokesperson Mr. Camille Morneau, Spokesperson Ms. Louise Therrien	Ministère de l'Agriculture, des Pêcheries et de l'Alimentation
Mr. Sylvain Caron	Ministère de la Culture et des Communications
Mr. Yves Rochon, porte-parole Ms. Diane Gagnon Ms. Marie-Claude Théberge	Ministère du Développement durable, de l'Environnement et des Parcs
Mr. Denis Goulet, Spokesperson Mr. Martin Roberge	Ministère du Développement économique, de l'Innovation et de l'Exportation

Mr. Ronald Richard, Spokesperson Mr. Gaétan Demers Mr. Raymond Jeudi Mr. Guy Verreault	Ministère des Ressources naturelles et de la Faune
Mr. Bernard Pouliot, Spokesperson Mr. Luc Lefebvre	Ministère de la Santé et des Services sociaux
Ms. Diane Migneault, Spokesperson Mr. Jacques Bélanger Mr. Dave Castegan Mr. Jérôme Gagnon Mr. Romain St-Cyr	Ministère de la Sécurité publique
Mr. Daniel Tétreault, Spokesperson Mr. Christian Rouleau	Indian and Northern Affairs Canada
Mr. Thédore Carier	Ministère du Tourisme
Mr. Nicolas Gagnon	MRC of Rivière-du-Loup
Mr. Jacques M. Michaud, Spokesperson Mr. Steve Hêtu Mr. Paul Pelletier	Municipality of Cacouna
Mr. Robert Steedman, Spokesperson Ms. Alison Farrand	National Energy Board
Ms. Nadia Ménard, Spokesperson Mr. Michel Carrier Mr. Jean Desaulniers Mr. Benoît Dubeau	Parks Canada
Mr. Claude Brassard, Spokesperson Ms. Manon Laliberté Mr. Richard Nadeau	Fisheries and Oceans Canada
Mr. Livain Michaud, Spokesperson Mr. Phil Lightfoot	Natural Resources Canada
Ms. Élizabeth Boivin	Health Canada
Mr. André Maltais	Secrétariat aux affaires autochtones

Mr. Michel Boulianne, Spokesperson Mr. Denis Bastien Mr. Serge Bélanger Ms. Élaine Bolduc Mr. René Laperrière Mr. Daniel Morin	Transport Canada

Participants

	Briefs
Mr. Jean-Guy Allard	Oral
Ms. Denise Beaulieu	DM34
Mr. Guy Beaulieu	DM33 DM33.1
Mr. Rémi Beaulieu	
Mr. Philippe Bélanger	DM87
Ms. Lucille Bouchard	DM14 DM14.1 DM14.2
Ms. Josée Boudreau	DM76 DM76.1
Ms. Martine Bruneau, Malécite de Viger First Nation	DM48
Ms. Cynthia Calusic	DM5
Mr. Gaston Cadrin	
Mr. Pierre Cambon	DM51 DM51.1
Ms. Michelle Chamard Ms. Marie-Josée Henry	DM70 DM70.1
Mr. Denis Cusson Mr. Gérald Dionne jr	DM40
Mr. Réjean Dion	DM42

Ms. Lynda Dionne Mr. Georges Pelletier	DM32 to DM32.3
Mr. Michel Dionne	DM69
Mr. Marco Dubé	DM50
Mr. Jean Genest, Malécite de Viger First Nation	DM85
Mr. Jocelyn Guimont Mr. Armand Pelletier	DM77
Mr. Gaston Hervieux	DM92
Mr. Peter W. Jones	DM90
Mr. Nelson Landry, Malécite de Viger First Nation	DM83
Mr. Pierre Larochelle	DM82
Ms. Johanne Lepage for Mr. Bertrand Gaudreau	DM53 DM53.1 DM53.2
Mr. Jacques Levasseur	
Ms. Jeanne Maguire	DM59
Ms. Élise Marquis	DM20
Mr. Denis Michaud	DM38
Mr. Gérard Michaud	DM29 DM29.1 DM29.2 DM29.3 DM29.4
Ms. Caroline Mongeau	DM19
Mr. Gilles Nadeau	DM30 DM30.1
Mr. Denis Ouellet	DM12
Ms. Catherine Pelletier	DM89
Mr. Georges Pelletier	DM31

Mr. Jean-Baptiste Pelletier		
Ms. Sylvie Pomerleau Mr. Germain St-Onge		DM78 DM78.1
Ms. Nancy L. Ramsay		DM6 DM6.1
Mr. Claude Rioux		DM79
Mr. François Rochon		DM91
Mr. Yvan Roy		DM75 à DM75.2
Ms. Julie Sénéchal		
Mr. Pierre-Paul Sénéchal		
Mr. Célestin Simard Ms. Mona Simard		DM71
Mr. Julien Soucy-Thiboutot		DM27
Ms. Lise Thibault		
Mr. Bruno Vincent		DM54
Agence de la santé et des services sociaux du Bas-Saint-Laurent	Mr. Bernard Pouliot	DM22
Canadian Association of Chemical Products Manufacturers	Mr. Jean Carpentier Mr. Jules Lauzon Mr. Louis A. Rail	DM1 DM1.1
Canadian Gas Association		DM15
Industrial Gas Consumers Association		DM3
Association des constructeurs de routes et grands travaux du Québec		DM10
Association internationale des débardeurs, local 2033	Mr. Régis D'Amours Mr. Damien Dubé	DM52

Association québécoise de lutte contre la pollution atmosphérique	Mr. André Bélisle Mr. Mathieu Castonguay	DM68
Association touristique régionale du Bas-Saint-Laurent		DM43
Breton, Banville et Associés		DM7
Centre de santé et de services sociaux de Rivière-du-Loup	Mr. Normand Gervais	DM62
Centre local de développement de la région de Rivière-du-Loup	Mr. Daniel Bérubé Ms. Marie-Josée Huot	DM21 DM21.1
Chambre de commerce de la MRC de Rivière-du-Loup	Mr. Pierre Lévesque	DM35 to DM35.2
CIMA +		DM18
Club des ornithologues du Bas-Saint-Laurent	Ms. Claire Douville Ms. Julie Marcoux	DM61
Comité de recherche et d'intervention environnementale du Grand-Portage inc.	Ms. Marie-Hélène Gaudreault Mr. Gaëtan Malenfant	DM49 DM49.1
Comité de santé de l'île Verte	Mr. André Cloutier Mr. Denis Cusson	DM39
Comité ZIP du sud de l'estuaire		DM25
Commission de développement du parc portuaire de Gros-Cacouna	Mr. Bruno Gagnon Ms. Marie-Josée Huot Mr. Jacques M. Michaud	DM17 DM17.1
Commission jeunesse du Bas-Saint-Laurent	Ms. Laurie Pelletier	DM88
Commission scolaire de Kamouraska–Rivière-du-Loup		DM8
Conférence régionale des éluEs du Bas-Saint-Laurent	Mr. Gérald Beaudry	DM57
Conseil central du Bas-Saint-Laurent	Ms. Isabelle Ménard Ms. Raymonde Robinson	DM41

Conseil des monuments et sites du Québec		DM36
Conseil régional de l'environnement du Bas-Saint-Laurent	Ms. Luce Balthazar	DM47
Corporation de développement de Saint-Germain-de-Kamouraska	Mr. Roméo Bouchard	DM24
Corporation des propriétaires de l'île pour la conservation de l'île Verte	Mr. Hugo Latulippe Ms. Danielle Pitre	DM37
Corporation du port de plaisance Gros-Cacouna	Mr. Jean-Pierre Belzile	DM84
Entreprise Form-Éval inc.	Mr. Mario Dubé	DM2
Équiterre	Mr. Patrick Bonin Ms. Laure Waridel	DM72
Étape Normandie Rivière-du-Loup	Mr. Michel Rioux Ms. Alexandra Roio Ms. Ursule Thériault	DM44
Famille Émond-Paradis	Ms. Brigitte Émond Mr. Bruno Paradis	DM66
Fédération de l'UPA du Bas-Saint-Laurent	Mr. Gilles Guimond Mr. Jean-Claude Parenteau	DM23
Fédération des chambres de commerce du Québec	Mr. Bernard Hogue	DM28
Fédération québécoise du canot et du kayak et Route bleue du sud de l'estuaire	Mr. Roger De La Durantaye	DM11
Greenpeace au Québec	Mr. Éric Darrier	DM80 DM80.1
Groupe de recherche et d'éducation sur les mammifères marins		DM73
Inspec-sol		DM58
Institut maritime du Québec	Mr. Gaétan Boivin	DM9

Les Amis de la vallée du Saint-Laurent	Mr. André Stainier Ms. Marylène Thibault	DM65 à DM65.2
Les propriétaires à la pointe sud ouest et résidants saisonniers ou permanents	Mr. Léopold Fraser	DM13
Mouvement Au Courant	Mr. John Burcombe	DM93
MRC de Rivière-du-Loup	Mr. Raymond Duval Mr. Michel Lagacé	DM45
MRC des Basques	Mr. François Gosselin	DM4
Municipality of Cacouna	Mr. Nicolas Gagnon Mr. Jacques Michaud	DM16 DM16.1
Municipality of Notre-Dame-des-Sept-Douleurs	Mr. Gilbert Delage	DM56
Nature Québec/UQCN	Mr. Charles-Antoine Drolet Mr. Harvey Mead Mr. Ron Tiffany	DM74
Office du tourisme et des congrès de Rivière-du-Loup	Mr. Pierre Bossé Ms. Claudette Dumont	DM46
Green Party of Canada for the Montmagny, L'Islet, Kamouraska and Rivière-du-Loup Districts	Mr. Serge Lemay Mr. Bernard Viau	DM86
Regroupement des citoyens et citoyennes en faveur du port méthanier	Ms. Huguette Guérette	DM63 DM63.1
Regroupement national des conseils régionaux de l'environnement du Québec	Mr. Philippe Bourque Mr. Marc Turgeon	DM64 DM64.1
Société de développement économique du Saint-Laurent		DM81
Société pour vaincre la pollution	Mr. Daniel Green	
Table de concertation de l'industrie métallurgique du Québec	Mr. Michel Gariepy Mr. Jean-Paul Schaack	DM55
TransAlta		DM26

City of Rivière-du-Loup	Mr. Éric Côté Mr. Jean D'Amour Mr. Gaétan St-Pierre	DM60
Vision Cacouna	Mr. Claude Gaumond	DM67

A total of 91 briefs and 2 oral testimony were submitted to the Panel during the second part of the public hearings. In addition, the Panel has received 20 written comments from the public during the extension of its mandate.

Appendix 2

Documentation

Consultation centers

Françoise-Bédard Municipal Library Rivière-du-Loup	Biblio-Cacouna
Municipal Office of Cacouna	Centre administratif municipal Municipalité de L'Isle-Verte L'Isle-Verte
Université du Québec in Montréal Montréal	Bureau du BAPE Québec

Documents submitted for the project under review

Procedure

PR1 TRANSCANADA PIPELINES LIMITED et PETRO-CANADA. *Avis de projet*, septembre 2004, 14 pages.

PR2 MINISTÈRE DE L'ENVIRONNEMENT. *Directive du ministre de l'Environnement indiquant la nature, la portée et l'étendue de l'étude d'impact sur l'environnement*, octobre 2004, 29 pages.

PR2.1 AGENCE CANADIENNE D'ÉVALUATION ENVIRONNEMENTALE. *Directive finale pour la préparation de l'étude d'impact du projet Énergie Cacouna*, octobre 2005, 46 pages.

PR2.1.1 CANADIAN ENVIRONMENTAL ASSESSMENT AGENCY. *Final Guidelines for the Preparation of the Environmental Impact Statement for the Cacouna Energy Project*, octobre 2005, 44 pages.

PR3 TRANSCANADA PIPELINES LIMITED et PETRO-CANADA. *Documentation relative à l'étude d'impact déposée au ministre du Développement durable, de l'Environnement et des Parcs*.

PR3.1 *Étude d'impact*, mai 2005, pagination diverse.

PR3.2 *Annexes*, mai 2005, pagination diverse.

PR3.3 *Synthèse*, 50 pages.

PR4 Do not apply.

PR5 MINISTÈRE DU DÉVELOPPEMENT DURABLE, DE L'ENVIRONNEMENT ET DES PARCS. *Questions et commentaires adressés au promoteur*, 14 septembre 2005, 44 pages et annexes.

PR5.1 TRANSCANADA PIPELINES LIMITED et PETRO-CANADA. *Réponses aux questions et commentaires du ministère du Développement durable, de l'Environnement et des Parcs*, pagination diverse. (La réponse complète à la question QC-146 est déposée sous la cote PR5.1.1.)

PR5.1.1 TRANSCANADA PIPELINES LIMITED et PETRO-CANADA. *Réponse à la question QC-146*, 2 pages.

PR5.2 MINISTÈRE DU DÉVELOPPEMENT DURABLE, DE L'ENVIRONNEMENT ET DES PARCS. *Questions et commentaires – 2e série*, 10 novembre 2005, 14 pages.

PR5.2.1 TRANSCANADA PIPELINES LIMITED et PETRO-CANADA. *Réponses aux questions et commentaires du ministère du Développement durable, de l'Environnement et des Parcs (2e série)*, pagination diverse.

PR6 MINISTÈRE DU DÉVELOPPEMENT DURABLE, DE L'ENVIRONNEMENT ET DES PARCS. *Recueil des avis issus de la consultation auprès des ministères et organismes sur la recevabilité de l'étude d'impact*, du 1er juin au 21 novembre 2005, pagination diverse.

PR6.1 MINISTÈRE DU DÉVELOPPEMENT DURABLE, DE L'ENVIRONNEMENT ET DES PARCS. *Correspondance avec la Régie du bâtiment concernant la demande d'avis sur la réglementation*, 22 février 2006, 1 page et annexe.

PR7 MINISTÈRE DU DÉVELOPPEMENT DURABLE, DE L'ENVIRONNEMENT ET DES PARCS. *Avis sur la recevabilité de l'étude d'impact*, 6 février 2006, 4 pages.

PR8 TRANSCANADA PIPELINES LIMITED et PETRO-CANADA. *Désignation cadastrale pour la localisation du projet*, 24 février 2006, 1 page.

PR8.1 TRANSFERT ENVIRONNEMENT. *Rapport de préconsultation sur l'étude d'impact*, juillet 2005, pagination diverse.

PR8.2 TRANSCANADA PIPELINES LIMITED et PETRO-CANADA. *Étude de références sur la qualité de l'air et sur le climat; l'environnement sonore; les sols et le terrain; l'étude hydrogéologique; la qualité des eaux de surface et des sédiments; les processus côtiers; la végétation et les milieux humides; la faune terrestre et aviaire; les poissons marins et leur habitat; les poissons des eaux intérieures et leur habitat; les mammifères marins; les ressources patrimoniales; l'étude socioéconomique; les ressources visuelles*, septembre 2005, pagination diverse.

PR8.2.1 TRANSCANADA PIPELINES LIMITED et PETRO-CANADA. *Étude de références sur les mammifères marins et sur les poissons marins et leur habitat.* Addenda, février 2006, pagination diverse.

PR8.3 TRANSCANADA PIPELINES LIMITED et PETRO-CANADA. Addenda – *Transport maritime*, novembre 2005, pagination diverse.

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DC48 Gilles NADEAU. *Commentaires et questions sur les modifications apportées au projet*, 11 octobre 2006, 2 pages.

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DD5 BUREAU D'AUDIENCES PUBLIQUES SUR L'ENVIRONNEMENT. *Demande d'avis à Transports Canada concernant les risques d'accident au terminal méthanier et leurs effets sur la santé de la population et des travailleurs du port de Gros-Cacouna et du terminal; les risques d'accident des méthaniers; la configuration du quai d'amarrage et les diverses mesures de navigation proposées; les mesures de surveillance proposées; les engagements envers les locataires; la poursuite des activités industrialo-portuaires; les contraintes résultant du gazoduc*, 19 mai 2006, 1 page. (Réponse DB38.)

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DQ4.1 SECRÉTARIAT AUX AFFAIRES AUTOCHTONES. *Réponses aux questions du document DQ4*, 1er juin 2006, 2 pages.

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DQ5.1 MINISTÈRE DES AFFAIRES INDIENNES ET DU NORD CANADIEN. *Réponses aux questions du document DQ5*, 30 mai 2006, 3 pages.

DQ6 BUREAU D'AUDIENCES PUBLIQUES SUR L'ENVIRONNEMENT. *Questions adressées à Transports Canada concernant le démantèlement; la qualité de l'eau et des sédiments; les glaces; les autochtones et le projet Énergie Cacouna*, 19 mai 2006, 2 pages.

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DQ7 BUREAU D'AUDIENCES PUBLIQUES SUR L'ENVIRONNEMENT. *Questions adressées à Pêches et Océans Canada concernant la faune et ses habitats; le bruit en milieu marin; les processus littoraux*, 19 mai 2006, 2 pages.

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DQ8.1 MINISTÈRE DES RESSOURCES NATURELLES ET DE LA FAUNE. *Réponses aux questions du document DQ8*, 29 mai 2006, 2 pages.

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DQ12.1 MRC DE RIVIÈRE-DU-LOUP. *Réponse à la question du document DQ12*, 31 mai 2006, 2 pages.

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DQ18 BUREAU D'AUDIENCES PUBLIQUES SUR L'ENVIRONNEMENT. *Questions adressées à Transports Canada concernant les mesures de sûreté; les hélices*, 5 juin 2006, 2 pages.

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DQ20 BUREAU D'AUDIENCES PUBLIQUES SUR L'ENVIRONNEMENT. *Question adressée à Ressources naturelles Canada concernant les incidences d'un terminal méthanier*, 5 juin 2006, 2 pages. (Réponse à DQ18.1)

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DQ22 BUREAU D'AUDIENCES PUBLIQUES SUR L'ENVIRONNEMENT. *Questions complémentaires au document DQ8.1 adressées au ministère des Ressources naturelles et de la Faune concernant l'éperlan; l'habitat faunique*, 5 juin 2006, 2 pages.

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DQ24 BUREAU D'AUDIENCES PUBLIQUES SUR L'ENVIRONNEMENT. *Questions adressées au promoteur concernant le système à circuit fermé pour la regazéification du LNG*, 9 juin 2006, 1 page.

DQ24.1 TRANSCANADA PIPELINES LIMITED et PETRO-CANADA. *Réponses aux questions du document DQ24*, juin 2006, 1 page.

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DQ25.1 TRANSCANADA PIPELINES LIMITED et PETRO-CANADA. *Réponses aux questions du document DQ25*, juin 2006, 3 pages.

DQ26 BUREAU D'AUDIENCES PUBLIQUES SUR L'ENVIRONNEMENT. *Questions adressées au promoteur concernant le plan de sûreté*, 21 juin 2006, 1 page

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DQ27.1 TRANSPORTS CANADA. *Information relative au lien Internet pour le règlement concernant les classes de glaces* [www.tc.gc.ca/lois-reglements/GENERALE/L/lppea/reglements/001/lppea001/lppea001.html] *et celui en regard du décret sur les zones de contrôle de la sécurité de la navigation* [www.tc.gc.ca/lois-reglements/GENERALE/L/lppea/reglements/010/lppea010/lppea010.html].

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DQ31.1.1 TRANSPORTS CANADA. *Précisions apportées au point 3 des réponses au document 31.1*, 16 août 2006, 1 page.

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DQ33 BUREAU D'AUDIENCES PUBLIQUES SUR L'ENVIRONNEMENT. *Question adressée au promoteur concernant le pompage des eaux de ballast des méthaniers et la survie des larves et des juvéniles de l'Éperlan arc-en-ciel*, 7 juillet 2006, 1 page.

DQ33.1 TRANSCANADA PIPELINES LIMITED et PETRO-CANADA. *Réponse à la question du document DQ33*, juillet 2006, 2 pages.

DQ34 BUREAU D'AUDIENCES PUBLIQUES SUR L'ENVIRONNEMENT. *Question adressée au promoteur concernant la construction de quais temporaires*, 11 juillet 2006, 1 page.

DQ34.1 TRANSCANADA PIPELINES LIMITED et PETRO-CANADA. *Réponse à la question du document DQ34*, juillet 2006, 1 page.

DQ35 BUREAU D'AUDIENCES PUBLIQUES SUR L'ENVIRONNEMENT. *Questions adressées au promoteur concernant les compensations pour les pertes et les perturbations d'habitats du poisson et la taille des méthaniers*, 12 juillet 2006, 1 page.

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DQ38 BUREAU D'AUDIENCES PUBLIQUES SUR L'ENVIRONNEMENT. *Demande adressée au promoteur pour obtenir une analyse comparative entre le gaz naturel livré par pipeline et le gaz naturel qui serait livré par méthanier*, 19 juillet 2006, 1 page.

DQ38.1 TRANSCANADA PIPELINES LIMITED et PETRO-CANADA. *Réponse à la demande du document DQ38*, juillet 2006, 1 page et annexe.

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DT13 Session held in Cacouna on June 15 in the afternoon, 53 pages.

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Appendix 3

Canada-Quebec Agreement on Environmental Assessment Cooperation

WHEREAS Canada and Quebec recognize that environmental assessment, which includes public participation, is an important environmental management and planning tool for promoting sustainable development objectives;

WHEREAS both governments have, respectively, environmental assessment responsibilities and wish to assume these responsibilities in a cooperative manner;

WHEREAS Canada and Quebec favour conducting cooperative environmental assessments, within the framework of this bilateral agreement, when an environmental assessment is required pursuant to the *Canadian Environmental Assessment Act* and pursuant to the Quebec *Environment Quality Act*;

WHEREAS Canada and Quebec favour a coordinated approach to the environmental assessments of projects in order to reduce overall delays, which could result from an uncoordinated application of their respective environmental assessment procedures, and this without compromising environmental protection;

THEREFORE the Parties agree to the following provisions:

DEFINITIONS

In this Agreement:

"**Cooperative environmental assessment**" means the environmental assessment of a project to be undertaken entirely in Quebec where Canada and Quebec have an environmental assessment responsibility and cooperate according to a coordinated process.

"**Environmental assessment**" means an assessment of the environmental effects of a project conducted in accordance with the *Canadian Environmental Assessment Act* or Division IV.1, Chapter I, of the Quebec *Environment Quality Act*.

"**Environmental assessment responsibilities**" means, for Canada, the powers, duties or functions, the exercise of which requires an environmental assessment in accordance with the *Canadian Environmental Assessment Act,* and for Quebec, the exercise of the powers and duties vested in the Minister of the Environment under Division IV.1 of the Quebec *Environment Quality Act*.

"**Environmental impact statement**" means the assessment report on a project's environmental impacts prepared by a proponent to meet the requirements of the *Canadian Environmental Assessment Act* and of Division IV.1 of the Quebec *Environment Quality Act* and of the Quebec *Regulation respecting environmental impact assessment and review.*

"Guidelines" means, for Canada, guidelines on the scope of the project, the factors as well as the scope of these factors to be considered in the context of an environmental assessment pursuant to Sections 15 and 16 of the *Canadian Environmental Assessment Act* and, for Quebec, the directive of the Minister of the Environment on the nature, scope and extent of the environmental impact statement that the project proponent must prepare pursuant to Section 31.2 of the Quebec *Environment Quality Act.*

"Parties" means Canada and Quebec.

"Project" means, for Canada, a project as defined in subsection 2(1) of the *Canadian Environmental Assessment Act* and, for Quebec, a project subject to the environmental impact assessment and review process as defined under Division IV.1 of the Quebec *Environment Quality Act*.

"Proponent" has, for Canada, the meaning defined in Section 2(1) of the *Canadian Environmental Assessment Act* and, for Quebec, includes the initiator of a project as defined in Section 31.2 of the Quebec *Environment Quality Act*.

"Responsible authority" means any person or body required, pursuant to the *Canadian Environmental Assessment Act* or its regulations, to ensure that an environmental assessment of a project is conducted.

INTERPRETATION

1. (1) Neither Canada nor Quebec give up, by virtue of this Agreement, any rights, competencies, powers, privileges, prerogatives or immunities.

(2) This Agreement:

a. constitutes an administrative framework within which the Parties collaborate to exercise their respective powers and duties with respect to environmental assessment as set out in the *Canadian Environmental Assessment Act* and in Division IV.1 of the Quebec *Environment Quality Act*;

b. must be interpreted in accordance with the Canadian Environmental Assessment Act and the Quebec Environment Quality Act, as well as other legal requirements, including, but not limited to, legislative requirements;

c. does not establish new powers or duties nor does it alter the powers and duties established by the Canadian Environmental Assessment Act and the Quebec Environment Quality Act, and is not legally binding on the Parties;

d. does not affect in any way the independence and autonomy of any commission of the Bureau d'audiences publiques sur l'environnement or joint review panel which may participate in the conduct of a cooperative environmental assessment.

SCOPE

2. This Agreement applies to any person or body responsible in Quebec for the application of the *Canadian Environmental Assessment Act* or of Division IV.1 of the Quebec *Environment Quality Act*, and the regulations made thereunder.

OBJECTIVES

3. The objectives of this Agreement are to:

a. foster cooperation and coordination between the Parties concerning the environmental assessment of projects while meeting the requirements of the *Canadian Environmental Assessment Act* and of the *Quebec Environment Quality Act*;

b. describe the roles and responsibilities of the Parties in implementing cooperative environmental assessments, thereby achieving more efficient use of public and private resources.

COORDINATION OF THE AGREEMENT

4. (1) Each Party will designate a representative to be responsible for:

a. jointly implementing and administrating this Agreement, including developing joint operational procedures, as needed;

b. facilitating consultation and cooperation between the Parties in relation to general environmental assessment matters and in relation to projects subject to a cooperative environmental assessment;

c. coordinating and facilitating relations and communications on general environmental assessment matters with government departments and agencies, potential proponents, the general public, and where appropriate, Aboriginal communities;

d. reviewing, at least once a year, the implementation of this Agreement and evaluate the effectiveness of the process for the cooperative environmental assessments undertaken.

(2) The designated representatives will consult each other concerning the interpretation and application of this Agreement and cooperate to resolve disputes. They will consult one another as necessary to review the observations and comments of departments, proponents and the public concerning the application of the Agreement.

(3) Quebec's representative will be the Directeur des évaluations environnementales du ministère de l'Environnement located in Québec, Quebec (hereinafter called "Quebec's representative"). Canada's representative will be the director of the office of the Canadian Environmental Assessment Agency located in Québec, Quebec (hereinafter called "Canada's representative"). Each Party will inform the other Party of any change in its designated representative.

PRELIMINARY CONSULTATIONS

Proponents

5. (1) The Parties will consult each other and will collaborate with proponents as early as possible to ensure that the information needed to determine their environmental assessment responsibilities is included in any project description provided pursuant to the *Canadian Environmental Assessment Act* or a project notice made pursuant to the Quebec *Environment Quality Act*.

(2) The Parties will advise proponents, at the earliest opportunity, about the potential for a cooperative environmental assessment.

Exchange of Information

6. (1) The Parties will notify each other in a timely manner about projects that are potentially subject to a cooperative environmental assessment and will provide each other mutual access to the relevant information on the projects, taking into account their respective legislative requirements.

(2) When the Quebec Minister of the Environment receives a project notice pursuant to Section 31.2 of the Quebec *Environment Quality Act* and this project is likely to be subject to the *Canadian Environmental Assessment Act*, Quebec's representative will provide the project description and any other related documentation to Canada's representative as soon as possible.

(3) When Canada determines that an environmental assessment of a project pursuant to the *Canadian Environmental Assessment Act* is required and that this project is likely to be subject to the Quebec *Environment Quality Act*, Canada's representative will provide the project description and any other related documentation to Quebec's representative as soon as possible.

(4) The notified Party will identify, in a timely manner, the information required to determine its environmental assessment responsibilities, and the extent to which it may wish to participate in consultations with the proponent.

(5) The Parties may jointly specify in writing the types of projects for which information sharing is not necessary.

DETERMINATION OF ENVIRONMENTAL ASSESSMENT RESPONSIBILITIES

7. (1) The Parties agree to determine, as soon as practicable and within any time frames set out in legislation, regulation or operational policy statements, whether they have an environmental assessment responsibility in relation to a project and to notify each other as early as possible.

(2) If either Party believes that it may have an environmental assessment responsibility, but deems the information provided in the project description or project notice insufficient to make a final decision, it will request additional information from the proponent and provide a copy of the information request and the proponent's response to the other Party.

(3) In the event that one Party has an environmental assessment responsibility and the other Party believes that it may have an environmental assessment responsibility, but has not yet made a decision, the Parties will cooperate until a decision has been made in this regard.

COOPERATIVE ENVIRONMENTAL ASSESSMENTS

8. (1) Where both Parties establish that they have an environmental assessment responsibility for a project, they agree to undertake a cooperative environmental assessment.

(2) The cooperative environmental assessment of a project will be administered in a manner that allows both Parties to meet the requirements of their respective legislation.

Coordinators

9. (1) For any project that is subject to a cooperative environmental assessment, each Party will appoint a coordinator capable of fulfilling the responsibilities set out in clause (4) below and will communicate this promptly to the other Party.

(2) Quebec's coordinator will be Quebec's representative or any other designated person by the latter.

(3) Canada's coordinator will be Canada's representative, or any other person designated by the latter, who will act as the federal environmental assessment coordinator, unless confirmed otherwise by Canada's representative to Quebec's representative.

(4) Each coordinator will:

a. coordinate its Party's participation in the cooperative environmental assessment;

b. communicate with the relevant departments and agencies in their respective government to confirm the co-chair or chair of the cooperative environmental assessment committee;

c. work with the other coordinator to resolve any disputes that may arise during the cooperative environmental assessment;

d. coordinate that Party's consultations with the other Party, the proponent and the public on matters pertaining to the cooperative environmental assessment;

e. ensure that the Party it represents meets the schedule established pursuant to clause 10(2)(a) for the cooperative environmental assessment.

Cooperative environmental assessment committee

10. (1) A cooperative environmental assessment committee will manage each cooperative environmental assessment and will ensure that, in the context of the environmental assessment, the relevant and necessary information to meet the requirements of the *Canadian Environmental Assessment Act* and of the Quebec *Environment Quality Act* is obtained and taken into account. The committee will be composed of the Parties' coordinators and of any other persons designated by the Parties' representatives. The cooperative environmental assessment committee is co-chaired by Quebec and Canada's coordinators unless agreed otherwise by the Parties.

(2) The cooperative environmental assessment committee is responsible for the following:

a. establishing a schedule for each stage of the assessment and ensure that it is adhered to;

b. developing guidelines for assessing the project's environmental effects;

c. reviewing the compliance of the environmental impact statement with the requirements of the guidelines;

d. analysing the environmental acceptability of the project;

e. coordinating, to the extent possible, the timing of decisions related to the administration of the cooperative environmental assessment;

f. performing any other related function.

(3) When establishing or modifying a schedule for the cooperative environmental assessment, the cooperative environmental assessment committee will consult the project proponent.

Public participation

11. To facilitate public participation in the cooperative environmental assessments, the public will:

a. have access to information concerning the environmental assessment of a project pursuant to applicable legislative provisions;

b. be informed of the conduct of a cooperative environmental assessment and the schedule for this assessment, including changes to the schedule;

c. have the opportunity to participate in any other way in the environmental assessment of the project, as provided for by the *Canadian Environmental Assessment Act* and the Quebec *Environment Quality Act*.

Guidelines

12. The cooperative environmental assessment committee will incorporate the information needs of both Parties in consolidated guidelines for the cooperative environmental assessment. The consolidated guidelines incorporate:

a. the directive delivered by the Quebec Minister of the Environment pursuant to article 31.2 of the Quebec *Environment Quality Act*; and

b. any necessary additional information in order to satisfy the requirements of the *Canadian Environmental Assessment Act*.

Compliance of the environmental impact statement

13. (1) The co-chair or chair of the cooperative environmental assessment committee, after receiving the proponent's environmental impact statement, will make the statement available to the cooperative environmental assessment committee and the departments concerned.

(2) The cooperative environmental assessment committee will review the environmental impact statement and, where applicable, comments received, in order to determine its compliance with the requirements of the guidelines and whether to request additional information.

(3) Where a Party determines that the information it requires to fulfill its legal obligations is not provided in the environmental impact statement, it will identify, while continuing to participate in the cooperative environmental assessment, the missing information it needs to fulfill its legal obligations, so inform the co-chair or chair of the cooperative environmental assessment committee and subsequently obtain the missing information independently, taking into account the schedule established in clause 10(2)(a).

JOINT REVIEW PANEL

14. (1) If, in the context of a cooperative environmental assessment, the Quebec Minister of the Environment decides, pursuant to the Quebec *Environment Quality Act*, to direct the Bureau d'audiences publiques sur l'environnement to conduct a public hearing on the project or if Canada decides to submit the project to a review panel which will conduct an environmental assessment pursuant to the *Canadian Environmental Assessment Act*, the concerned Party will provide immediate notice of its decision to the other Party and will consult on the possible establishment of a joint review panel.

(2) If the Parties agree that a joint review panel can be established in a manner that satisfies the requirements of the *Canadian Environmental Assessment Act* and the Quebec *Environment Quality Act*, they will proceed to establish a joint review panel in accordance with the provisions set out in Annex 1 of this Agreement. A joint review panel thus established fufils its mandate simultaneously with that of the Commission du Bureau d'audiences publiques sur l'environnement responsible for holding a public hearing on the project.

COORDINATION OF DECISIONS AND ANNOUNCEMENTS

15. (1) Upon completion of the cooperative environmental assessment, the Parties, if they deem the information collected during the assessment adequate to meet their respective requirements under the *Canadian Environmental Assessment Act* and the Quebec *Environment Quality Act*, will make their decisions under the said legislation, taking this information into account.

(2) To the extent possible, the Parties will coordinate the timing of decisions taken, during the cooperative environmental assessment, as well as any announcements pertaining to these.

(3) Upon completion of a cooperative environmental assessment, the Parties will inform each other of their decisions concerning the project and provide an opportunity to coordinate the announcement of such decisions. To the extent possible, neither Party will communicate its decisions directly to the proponent or the public without prior notification of the other Party.

MITIGATION AND FOLLOW-UP

16. The Parties will inform each other of the mitigation measures, monitoring and follow-up requirements and any other measures whose implementation is considered to be necessary and may, where it is possible and mutually advantageous to do so, coordinate the implementation of their respective requirements in this regard.

SHARING OF EXPERTISE

17. The parties may agree to share expertise on issues concerning the environmental assessment of a project by either Party.

RELATIONSHIP BETWEEN THIS AGREEMENT AND ABORIGINAL PEOPLES

18. (1) Where a project subject to a cooperative environmental assessment has the potential to cause adverse environmental effects on Aboriginal communities, the Parties will notify any potentially affected communities so that they may participate in the cooperative environmental assessment, as provided for by the *Canadian Environmental Assessment Act* and the Quebec *Environment Quality Act*, and their respective regulations.

(2) This Agreement does not apply to environmental assessment procedures established pursuant to a final land claim or self-government agreement or to agreements with Aboriginal communities or nations for which an environmental assessment procedure is already provided for.

TRANSBOUNDARY CONSIDERATIONS

19. (1) Where a project subject to a cooperative environmental assessment has the potential to cause significant adverse environmental effects in another province or territory of Canada, the co-chair or chair of the cooperative environmental assessment committee must ensure that the potentially affected province or territory is advised and consulted during the cooperative environmental assessment.

(2) Where a project subject to the *Canadian Environmental Assessment Act* is proposed in another province or territory of Canada and has the potential to cause significant adverse environmental effects in Quebec, Canada will ensure that Quebec is notified and consulted during the conduct of the environmental assessment. This provision does not apply when Quebec has entered into an agreement with another province or territory under which Quebec will be informed of any project and will have the opportunity to participate in the assessment process before it is completed.

RESOLUTION OF DISPUTES BETWEEN THE PARTIES

20. The parties involved will make every reasonable effort to agree on the interpretation and the application of this Agreement. The parties will endeavor to resolve any dispute related to this Agreement in accordance with the procedure set out in Annex 2.

DURATION OF THE AGREEMENT

21. (1) This Agreement will remain in effect for a period of five years from the date of signing. It may be renewed, with or without amendment, by written consent of the Parties.

(2) Prior to the expiration or renewal of the Agreement, the Parties will evaluate its effectiveness in attaining the objectives. This evaluation may include opportunities for public consultations by either Party, as required.

(3) This Agreement and its Annexes may be amended at any time by written consent of the Parties.

(4) Following consultation between the Parties, this Agreement may be terminated by either Party 45 days after written notice is provided to the other Party.

(5) In cases covered by (1), (3) and (4), the Parties will establish transitional arrangements for projects already subject to a cooperative environmental assessment.

SIGNATURES

In witness thereof, the Parties signed the present Agreement, this _____ day of _____ 2004.

For the government of Canada

_____
David Anderson
Minister of the Environment for Canada

For the government of Quebec

_____
Thomas J. Mulcair
Quebec Minister of the Environment

_____
Benoît Pelletier
Minister for Canadian Intergovernmental Affairs and Native Affairs

Annex I: Provisions for establishing a joint review panel

PURPOSE

This annex describes certain provisions for establishing a joint review panel to conduct cooperative environmental assessments of a project as provided for in clause 14 of the Canada–Quebec Agreement on Environmental Assessment Cooperation.

1. MEMBERSHIP OF JOINT REVIEW PANEL

(1) In general, a joint review panel shall be composed of three members. In this case, these members are named as follows:

a. The President of the Bureau d'audiences publiques sur l'environnement appoints two members from the Commission of the Bureau d'audiences publiques sur l'environnement mandated to review the project subject to a cooperative environmental assessment as members of the joint review panel, including the president of the said Panel. The Minister of the Environment for Canada approves the appointment of these members as members of the joint review panel, including that of the president of the Panel.

b. The Minister of the Environment for Canada proposes a third person to the President of the Bureau d'audiences publiques sur l'environnement. The President of the Bureau d'audiences publiques sur l'environnement and the Minister of the Environment for Canada appoint this third person as a member of the joint review panel.

c. The Quebec Minister of the Environment approves the appointment of the three members of the joint review panel.

(2) The members of the joint review panel shall be unbiased and free from any conflict of interest relative to the project under review; they have relevant knowledge or experience concerning the anticipated environmental effects of the project.

(3) The members of the joint review panel shall respect the spirit of the *Code d'éthique et de déontologie des membres du Bureau d'audiences publiques sur l'environnement.*

2. MANDATE AND POWERS OF THE JOINT REVIEW PANEL

(1) Mandate — A joint review panel shall conduct a public review of a project in order to meet the requirements of the *Canadian Environmental Assessment Act* and the Quebec *Environment Quality Act*.

(2) Powers — A joint review panel shall enjoy the powers and immunities conferred by Section 35 of the *Canadian Environmental Assessment Act*.

(3) A joint review panel shall produce its report within the same timeframe as the Commission of the Bureau d'audiences publiques sur l'environnement, in accordance

with the provisions set out in clause 6 of this Annex.

3. ADMINISTRATIVE AND TECHNICAL SUPPORT

The administrative and technical support required by the joint review panel is provided under an agreement to be reached between the Canadian Environmental Assessment Agency and the Bureau d'audiences publiques sur l'environnement.

4. JOINT REVIEW PANEL FILE

The project assessment file shall be made available to the public as provided for under the *Canadian Environmental Assessment Act* and the Quebec *Environment Quality Act*.

5. PUBLIC PARTICIPATION IN THE REVIEW AND REPORT

A joint review panel shall hold hearings to provide an opportunity for public participation.

6. REPORT

(1) Following an inquiry by the Bureau d'audiences publiques sur l'environnement for a project subject to a cooperative environmental assessment, the President of the Bureau d'audiences publiques sur l'environnement shall submit the report to the Quebec Minister of the Environment within the established timeframe.

(2) The joint review panel shall submit its report to the Minister of the Environment for Canada and to the Quebec Minister of the Environment within the same timeframe.

(3) The commission of the Bureau d'audiences publiques sur l'environnement and the joint review panel may produce a joint report. In this case, the Minister of the Environment for Canada and the Quebec Minister of the Environment will make the report public simultaneously.

(4) The Canadian Environmental Assessment Agency is responsible for the translation of public notices and of the final report of the joint review panel as to make them available in French and English. It is agreed that for Quebec, all communications are made in accordance with the *Charte de la langue française.*

7. COST SHARING

(1) Before the commencement of the joint review panel's work, the Canadian Environmental Assessment Agency and the Bureau d'audiences publiques sur l'environnement will agree on budget previsions, expenditures, and cost sharing procedures.

(2) The joint review costs are incurred by the joint review panel with due regard to economy and efficiency.

(3) The parties agree that the Canadian Environmental Assessment Agency or the Bureau d'audiences publiques sur l'environnement or their duly authorized

representatives shall verify and inspect all documentation (invoices, receipts and other pertinent documents) used by either party to calculate the shared costs incurred in managing the public review.

(4) When a verification conducted by either party as part of this Agreement reveals discrepancies in the amount invoiced to the other party, and the parties are not able to resolve the matter quickly, an independent auditor agreed to by both parties may be called on to resolve the dispute.

8. FINANCIAL ASSISTANCE TO PARTICIPANTS

Canada, through the Canadian Environmental Assessment Agency, agrees to administer its participant funding before the joint review panel begins its work.

Annex 2: Provisions for the resolution of disputes between the parties

1. The Parties will make every reasonable effort to agree on the interpretation and application of this Agreement, notably with respect to the scope of the project and the assessment, the compliance of the impact statement submitted by the proponent with the requirements of the guidelines, the significance of the environmental effects and matters relating to the process.

2. In the event of disagreement on these issues, the Parties will endeavour, to the extent possible, to resolve their disputes at an operational level.

3. When all reasonable means to resolve a dispute will have been exhausted at the operational level and when one Party is of the opinion that the dispute must be resolved at a higher level, that Party advises its designated representative, in writing, pursuant to Section 4 of the Agreement, by providing the reasons for which the Party considers it necessary to take the dispute to a higher level. Upon receipt of the notice, the representative immediately informs the other Party's representative of the request to refer the dispute to a higher level.

4. If they are of the opinion that it is appropriate to refer the dispute to a higher level, Canada's and Quebec's representatives agree on a schedule, on an procedure for resolving the dispute including the persons and organizations to be involved.

5. If the dispute has still not been resolved by the end of the agreed schedule pursuant to Section 4, Canada's and Quebec's representatives may, if they consider it advisable in order to facilitate a resolution, refer the matter to the President of the Canadian Environmental Assessment Agency and to the Deputy Minister of the ministère de l'Environnement du Québec.

6. The Parties agree that the dispute resolution process will in no way limit the powers and privileges of a responsible authority pursuant to the *Canadian Environmental Assessment Act* or the authority of the Government of Quebec pursuant to Division IV.1, Chapter I, of the *Environment Quality Act*.

7. The dispute resolution process does not apply in any way to cost sharing between the Bureau d'audiences publiques sur l'environnement and the Canadian Environmental Assessment Agency provided for under clause 7 of Annex 1 to this Agreement, or to any other dispute arising from the activities of the joint review panel.

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