



# IMPACTS OF CONSTRUCTING A METHANE PORT AT GROS-CACOUNA ON MARINE MAMMALS

## Context

TransCanada PipeLines Limited and Petro-Canada are presenting a joint proposal to implement the Energy Cacouna project to develop a methane terminal at Gros-Cacouna, on the south shore of the St. Lawrence Estuary, east of Rivière-du-Loup. This project has been at the heart of several discussions between the proponent and the DFO since 2005, and several advices from the marine mammal biology and conservation (MMBC) section of the DFO's Regional Science Branch (RSB) at the MLI were produced to meet the demands from the Environmental Assessment and Major Projects Branch (EAMPB). In November 2006, in order to complete the file on the impact of noise on marine mammals, the MMBC section had a few questions in terms of continuous noise levels stemming from sources used for construction according to the latest scenarios provided by the proponent. In February 2007, Cacouna Energy provided the answers from the new continuous noise modeling according to the latest construction scenarios, based on two possibilities (Cacouna Energy 2007a). According to the modeling, within a radius of 1.5 to 2.2 km around the work area, continuous noise levels will exceed 120 dB re 1  $\mu$ Pa RMS. An additional demand regarding weather conditions which forced a work interruption in the water was met in March 2007 by Cacouna Energy (Cacouna Energy 2007b). The EAMPB solicited the DFO's RSB at the MLI to assess the impacts of continuous noise during the construction and operation phases of the methane terminal. The demand was sent to the science advisory, information and support branch (SAISB) in the fall of 2006 and a final answer was sent in May 2007.

## Background

### Summary of previous partial advices from the MMBC section concerning this file:

In November 2005, Lesage (2005) formulated a first preliminary advice concerning the potential impact of the project on marine mammals. Although other species visit the area, the beluga is the species most likely to be affected due to its intense use of the area in summer, particularly during its calving period between June and August, and during herring spawning in May. This area is considered relatively calm compared to other beluga habitat areas. It likely presents peculiar acoustic conditions. Underwater noise associated with the various construction activities at the terminal are considered a major source of disturbance for the animals, which could affect their short and long term use of the habitat and even cause them physical harm. The proponent's initial impact assessments were considered incomplete and several questions and comments were raised. It was recommended that a more in depth assessment of the underwater noise be made, to develop mitigation measures, to consider constructing it during winter and the need to measure this noise during construction as well as implement a rigorous impact monitoring program over several years.

In May 2006, the MMBC answered a list of questions presented by the EAMPB on May 3<sup>rd</sup> 2006 to the SAISB concerning the effects of increasing sound levels based on the new estimates

presented by the proponent (Carr et al. 2006) as well as their assessment of beluga presence in the area (PESCA 2006). These answers helped formulate the 2006/02 DFO Expert advice (DFO 2006). A reminder was issued concerning the precarious context of St. Lawrence belugas and the importance of the area for births in summer and their food resources (confirmed in fact by the proponent's observations, PESCA 2006) as well as the relevance of the *Species at Risk Act* regulations (SARA, Section 32(1)) and the *Fisheries Act* (FA, marine mammal regulations). Results from underwater sound level impacts were analyzed and the advice stipulated that the noise increase is likely to considerably interfere with beluga activities, but that it is impossible to predict the exact reactions that will occur. It was also mentioned that the habitat that might be lost cannot be recovered. It was reiterated that work in summer needed to be restricted. It was mentioned that there is a problem in implementing visual observation measures of the animals that would be effective throughout the day in order to be able to monitor them during construction. A few critical elements were mentioned regarding underwater noise and animal behaviour that should be included in a program for monitoring project impacts. The issue was raised of increased traffic of very long vessels associated with the project for a methane super tanker port, the risks that this could represent for marine mammals, particularly for collisions with large cetaceans in the Estuary, such as the blue whale, fin whale or North Atlantic right whale, and the increased noise pollution and decrease of silent periods on the south shore. Also mentioned were the impacts associated with eventual accidental LNG spills.

In September 2006, the MMBC section formulated an advice regarding the change in method for constructing the terminal when pile driving, following a request by the SAISB in response to a request by Golder Associates (Gosselin 2006). The peculiar context of the St. Lawrence beluga population was reiterated and it was recognized that the loud noise period associated with pile driving was reduced compared with the initial project and concentrated in a small period of the week and the vibrating pile driving had been eliminated. The modelled radius was brought up for the 160 dB re 1  $\mu$ Pa RMS sound level and the need to verify the model with data in the field during operations. An advice was written concerning the irrelevance of questioning the NMFS criteria used for assessing noise impact. The need for planning a program for monitoring sound and behaviour impacts, before, during and after construction operations was reiterated.

## Analysis and Response

Two phases of the project must be considered in this analysis: construction of the terminal, which extended over a two year period, and operations, estimated to last a few decades. In agreement with the elements presented in the preliminary advices since November 2005, we estimate that the project for developing a methane super tanker terminal at Gros-Cacouna presents a considerable impact risk on marine mammals present in this area of the St. Lawrence Estuary as well as along the channel used by the methane super tankers in areas further downstream. The species most likely to be affected is the beluga, via the deterioration of the current condition of part of its habitat, more intense during the construction of the port and also on a longer term basis with its operations. Whales that frequent the Saguenay-St. Lawrence Marine Park, especially with the increased risk of collisions, which are considered risks that can affect less abundant cetacean populations. Seals that use the area in winter can also be affected indirectly by the change in ice cover associated with continuous ice-breaking operations to access the port. However, impacts on these populations are not as worrisome as with cetaceans.

The St. Lawrence beluga population is listed as an endangered species and has been part of a recovery plan for several years. Although measures have been implemented, the population hasn't shown any significant signs of recovery. Among the many factors potentially to blame, many concern the loss of habitat in the St. Lawrence ecosystem as well as a drop in quality. The proposed development project would be implemented in an area frequently used by belugas and is therefore likely to further alter the natural status of their habitat and potentially reduce even more their range. In the event the project is realized, the implementation and application of rigorous impact mitigation measures would help minimize the risk of additionally jeopardizing the population's recovery in the St. Lawrence. The implementation of a long term monitoring program, covering the periods before, during and after the construction of the port would help achieve impact monitoring on belugas and therefore determine the effectiveness of the mitigation measures.

Construction: The impact on marine mammals of constructing the terminal is associated with disturbance (*ref.* 120 dB re 1  $\mu$ Pa RMS continuous sources and 160 dB re 1  $\mu$ Pa RMS spontaneous sources) and risk of physical harm (*ref.* 180 dB re 1  $\mu$ Pa RMS) related to underwater noise of continuous or intermittent type ("a") and spontaneous ("b") related to the operations. The proponent produced some numerical simulation estimates for the radiuses around the sound source where the levels conventionally used as limits for animal exposure to noise are exceeded. These radiuses from sound propagation models based on average and approximate conditions should be confirmed with findings in real operation conditions in the field. For type "a" sounds associated to operations with tugs, barges, cranes and dispatch boats, the 120 dB re 1  $\mu$ Pa RMS level would be exceeded within the radius estimated at 1.5 to 2.2 km. For type "b" sounds, mostly associated with pile driving based on the new construction method, the 160 dB re 1  $\mu$ Pa RMS level would be exceeded within a radius estimated at 1.1 to 1.8 km.

In order to limit the impacts of the project on marine mammals, it is therefore imperative to minimize the most significant noise exposure to belugas. This objective could be reached by respecting and combining several mitigation measures such as:

- 1) during the females' most intense period in the area, at the end of their gestation period when they are with their calves, from mid-June to mid-September, prohibit any work in the water;
- 2) during the period when belugas are likely to use the area, but in a less intense manner or during a less critical period as mentioned above, from mid-May to mid-June and mid-September to mid-October, conduct the work when there are no belugas in a radius around the construction site where sound levels do not exceed 120 dB re 1  $\mu$ Pa RMS for continuous sources or 160 dB re 1  $\mu$ Pa RMS for spontaneous sources;
- 3) during periods other than those between mid-May to mid-October, conduct the work when there are no belugas in a radius around the construction site where sound levels do not exceed 180 dB re 1  $\mu$ Pa RMS;
- 4) at all times when work in the water is permitted, by limiting pile driving activities, estimated at 3 hrs per week, as well as ground dynamiting operations near the water, to daylight hours and according to weather conditions providing maximum detection of belugas within a wider perimeter so as to ensure that no herd or isolated individual is present inside or swimming towards the perimeter where sound levels exceed 160 dB re 1  $\mu$ Pa RMS.

Because construction is scheduled to occur 24 hrs/day, during the day and at night, in almost any weather condition (wind, waves, fog, etc) except for very strong storms, a continuous monitoring of the animals will be difficult to implement and appropriate methods will have to be developed. In light of this difficulty, it would be interesting that environmental conditions and the work area be monitored before, during and after the construction of the port, in order to evaluate the project impact mitigation measures and if necessary, to review their nature and application (see details below).

Operations: operations at the terminal will lead to increased traffic in the area by methane super tankers and their escorting ice-breakers and tugs. As mentioned in the November 2005 advice (Lesage 2005), the passage south of Île Rouge will lead to increased traffic in proximity of another highly frequented beluga habitat (south-east and east of Île Rouge). It is difficult to estimate the impacts of this new traffic. Calmer and quieter periods are certainly going to be reduced. Consequently, the quality of this habitat for marine mammals will be affected. The frequency of this traffic suggests that the impacts will be less than during the construction phase for belugas and seals. However, for larger whales such as the blue whale, fin whale and humpback whale, etc, that intensely frequent the deeper areas along the methane tanker passage way downstream from the terminal, the increased traffic of extremely large ships, escorted by tugs in certain areas, will increase the risk of collisions, which represents a well documented source of mortality for larger whales. Little is known concerning the noise produced by these vessels and the three-dimensional propagation around the ship where whales can be found and forced to choose a direction in order to avoid a collision. It will obviously be different for vessels currently travelling along the seaway, and the likely travel pattern for ships of this size could lead to faulty perceptions by a whale for avoiding the ships. These questions, which have no answer for the time being, as well as the choice of trajectory should be studied and be part of a monitoring and impact mitigation program.

Monitoring program: The impact monitoring program should be developed jointly with DFO experts, last several years during the operations and cover the situation before, during and after construction.

Measures *prior to construction* are necessary in order to adequately record the status of the areas before starting the project, particularly: 1) sound levels found in the area on a continuous basis throughout the year; 2) seasonal occupation by belugas, their numbers, the structure of the herd, their distribution in the area, their behaviour and their activities; 3) research into methods for monitoring the occurrence of belugas within the safety perimeter in conditions where adequate visual observations are impossible, such as at night or in difficult weather conditions.

*During construction*, the program for supporting the impact mitigation measures should include: 1) initial measures in real conditions with specific equipment that will be used in order to check the accuracy of the simulated sound level estimates using the propagation model, and correct the safety perimeter estimates if needed; 2) the monitoring of the sound levels in the area and the whale occurrence in the same monitored sector during the “prior to construction” period, including a continuous monitoring of the safety perimeter during the suggested periods mentioned above (points 1 to 4 from the section on *Construction*); 3) monitoring the occurrence of marine mammals over a large perimeter before and during pile driving activities and dynamiting operations near the water.

*After construction*, in order to record the impact of such a large-scale development project in a St. Lawrence area internationally recognized for its interest in marine mammals, resident or visitors from the Atlantic, and the object of many conservation and protection measures over several decades, the monitoring program should include measures for monitoring, over several years: 1) the occurrence of belugas in the extended area including the navigation channel as well as relevant natural or anthropogenic variables, such as increased underwater noise levels and the frequency of disturbance due to the occurrence of this new activity; 2) collaborating for monitoring size, time-space distribution and the structure of the St. Lawrence beluga population; 3) the characterization of the noise produced by methane super tankers, such as their directivity around the ship compared with other more common merchant vessels in the estuary in order to qualify the risk of collisions with whales during the passage used by methane super tankers and identify and implement solutions, when required.

## Conclusion

The species most likely to be affected by the methane terminal project is the beluga. This St. Lawrence population has an endangered species status and has been the focus of protection measures since 1979, and although the measures implemented, it shows no significant sign of recovery. The proposed development project will have an impact on a sector of the Estuary frequently used by the animals, particularly during the calving period in summer. This threatened population's habitat has been considerably reduced compared to what it used to be. The arrival of this new development project is a threat that may reduce the St. Lawrence beluga habitat even more. Because of the need to maintain a high level of protection for this population and in accordance with the principal of precaution in terms of uncertainties concerning the project impacts, we agree that special mitigation measures will have to be implemented in order to minimize the risks of affecting the population even more and jeopardize its chances of recovering. It also appears imperative to assess the effects of such a large-scale project over an extended period of many years including recording conditions before, during and after construction of the terminal by implementing an effective monitoring program. We are drawing attention to the impacts from terminal operations, from increased traffic in this area of the St. Lawrence and its surrounding areas, and the location of the passage that were mentioned in our previous advices and that have yet to be the focus of an in-depth assessment by the proponent.

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**Sources of Information**

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