ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT OF CANADIAN ROYALTIES INC.'S PORT INFRASTRUCTURE CONSTRUCTION PROJECT IN DECEPTION BAY, NUNAVIK

FEDERAL REVIEW PANEL NORTH

RECOMMENDATIONS REPORT

Presented to the Federal Administrator
under Section 23 of the
James Bay and Northern Quebec Agreement

June 2013

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1.0 BACKGROUND

1.1 Proponent

The proponent of the Nunavik Nickel project is Canadian Royalties Inc. (CRI), a mining exploration company founded in 1998. The company's head office is located at 800 René-Lévesque Blvd. West, Suite 410, Montreal, Quebec, H3B 1X9 (www.canadianroyalties.com). On January 13, 2010, the Chinese firm Jilin Jien Nickel Industry Co. Ltd. completed its acquisition of Canadian Royalties Inc., through its Canadian subsidiary, Jien Canada Mining Ltd.

1.2 Project history

Although CRI obtained the necessary permits and authorizations for the construction and operation of the Nunavik Nickel project in 2008, it was not until 2010, following acquisition of CRI by Jilin Jien Nickel Industry Co. Ltd., that financing to begin construction was approved. An agreement on the impacts and benefits of the project was signed in 2008 and renewed in 2009 between the authorities of Salluit, Puvirnituq, Kangiqsujuaq and Makivik Corporation, on the one hand, and the senior management of Jilin Jien Nickel Industry Co. Ltd., on the other.

Construction of the mine site infrastructure began in 2010, while work on the port infrastructure in Deception Bay began in 2011. In July 2011, a landslide involving 16,000 m^3 of blast rock occurred at the site planned for the wharf (site Q1) in Deception Bay. Following the landslide, the company decided to alter the site for the port infrastructure, resulting in the requirement for modifications to the authorizations already obtained or for new authorizations for the construction at a new site. As a result, new documents (project description, impact study, etc.) had to be submitted.

2.0 ASSESSMENT PROCESS BY COFEX-N

2.1 Mandate given to COFEX-N by the Federal Administrator

In December 2011, Canadian Royalties Inc. submitted an environmental impact statement for the new port infrastructure project to the Federal Administrator of the James Bay and Northern Quebec Agreement (JBNQA). In April 2012, under section 23 of the JBNQA, the Federal Administrator of the JBNQA gave the Environmental and Social Impact Review Panel (COFEX-N) a mandate to examine the impact statement submitted for the new port infrastructure construction project in Deception Bay.

The mandate given to COFEX-N included analyzing the environmental impact statement for the new project, drafting supplementary information requests to the proponent, as required, and holding public hearings, if necessary. Once the review is completed, COFEX-N must, under paragraph 23.4.22, transmit the recommendations on whether the project should be authorized—and if so, the conditions of authorization—to the Federal Administrator. The conditions include all mitigation measures considered necessary, as well as the necessary environmental monitoring and follow-up programs.

2.2 Review process

Within the framework of its review, COFEX-N reviewed the documents submitted by the proponent since December 2011, namely:

- The two environmental impact assessments:
  - *Construction of Port Infrastructure for the Nunavik Nickel Project, Deception Bay / Environmental Impact Assessment, December 2011*
  - *Environmental and Social Impact Assessment of the Deception Bay Wharf and Sediment Management, Volumes 1, 2 and 3, November 2012*.
- Responses to questions from COFEX-N, April 2012
- Responses to questions from COFEX-N, May 2013
- Responses to questions from COFEX-N, June 2013

After submitting the environmental impact statement for the revised project in December 2011, CRI made a number of further changes designed to optimize the project. Specifically, the sediment management approach was changed to land disposal, improvements were made to the wharf concept, and the wharf site was once again modified on the basis of the engineering studies. Given the major changes to the project flowing from the optimization work, CRI submitted a new environmental impact statement in November 2012. Since 2012, additional adjustments have been made to the wharf concept. The plans submitted to COFEX-N in June 2013 reflect the most recent wharf design. The review conducted by COFEX-N was therefore amended to reflect the changes made by CRI. All of the documents submitted have been reviewed by COFEX-N and its analysis and recommendations cover all information provided by CRI.

In the course of its review, COFEX-N met with the proponent on several occasions to clarify certain information. It also sent the proponent three series of questions and comments in April 2012, May 2013 and June 2013. CRI's responses to the three series of questions provided additional details on the project and environmental impact statement. The Panel also consulted experts to gain a better understanding of some of the technical and scientific aspects of the project.

In 2013, COFEX-N met with representatives of the Kativik Regional Government and Makivik Corporation to hear their respective concerns about the project. In May 2013, it held a public consultation in the northern villages of Kangiqsujuaq and Salluit, where the main Inuit users of Deception Bay live.

Lastly, throughout the review process, COFEX-N exchanged information and held meetings with the other federal and provincial regulatory authorities involved in the environmental impact assessment of the project, including Fisheries and Oceans Canada (DFO), Transport Canada (TC), the Kativik Environmental Quality Commission (CQEK) and the Nunavik Marine Region Impact Review Board (NMRIRB).

3.0 PROJECT DESCRIPTION

The Nunavik Nickel project involves the construction and operation of an open-pit mine for primary nickel extraction and secondary copper extraction and the construction of port infrastructure at Deception Bay. The mine is located south of the Raglan Mine, which was given authorization to begin operations in 1995, and north of Pingualuit provincial park, between the northern villages of Salluit and Kangiqsujuaq.

This recommendations report deals only with the construction and operation of the port infrastructure in Deception Bay. The project covered by COFEX-N's review mandate specifically consists of the construction of the wharf, dredging and sediment management operations, the transshipment of concentrate onto the ships and shipping activities in Deception Bay related to transporting the concentrate. Other infrastructure, specifically the ore concentrate storage facility, work camp, oil depot and access roads, were built in or before 2012, in accordance with the authorization sent by the Federal Administrator in 2008.

3.1 Wharf construction

In its environmental impact statement of November 2012, the proponent presented two sites for the wharf construction—Q1 and Q2—for which a comparative assessment had been conducted. Both sites are located in Deception Bay and are approximately 800 m apart (Appendix 1: Study Area and Location of Project Components). The proponent indicates that the results of the comparative analysis of the technical feasibility and environmental impacts of these two sites favour locating the wharf at Q1. According to the proponent, although site Q1 was altered as a result of the landslide that occurred in July 2011, major improvements to the design concept mean that the site can once again be considered for the wharf site.

Since December 2011, the proponent has optimized the project concept several times. The latest updates to the wharf design concept, presented in May 2013, call for a permanent wharf comprising two sheet pile cells, two protective stone walls surrounding the cells, and a pile-supported steel bridge with access ramps (Appendix 2: Wharf Site Plan). Three closed conveyors equipped with dust control systems will be built between the concentrate storage facilities and the wharf, which will allow for transshipment of the ore directly onto the ships. During loading, the vessel will move along the wharf and the manoeuvring area of the vessel around the wharf would extend roughly 24,000 m^2.

A temporary wharf could be built to allow loading of the ships before the construction of the permanent wharf is completed. According to the proponent, the temporary wharf will likely no longer be necessary if the construction of the permanent wharf proceeds as planned (e-mail from the proponent to COFEX-N dated June 17, 2013). The design concept for the temporary wharf included a barge, a steel bridge that would be recovered for the permanent wharf and a supporting pile, which would be removed at the end of the period of use. This temporary wharf would have to be dismantled before the winter of 2013, since it is not designed to withstand ice movements.

3.2 Dredging and sediment management

With the proponent's revised design concept for the permanent wharf at site Q1, it is anticipated that marine sediment dredging requirements would be limited to 22,000 m^3. The proponent has indicated that an excavator will be used for dredging work in the tidal zone and an environmental clamshell bucket for work in the water (CRI 2013a). The purpose of dredging is essentially to clear a stable base on the bottom for the two sheet pile cells. The clay material excavated from these sites will be replaced with riprap from existing disposal sites resulting from previous excavation work.

Benthic invertebrate surveys conducted by the proponent in Deception Bay confirm the presence of soft corals at the preferred sediment disposal site and their likely presence at the other potential sites. The Government of Canada has committed to protecting this type of coral by supporting a resolution adopted by the General Assembly of the United Nations in 2006. The federal authorities informed the proponent that they could not authorize the disposal of sediments at that site, and that additional surveys were required to verify the presence of soft corals at the other sites. The proponent subsequently decided to opt for land-based sediment disposal.

An alternatives analysis of four disposal sites was conducted to identify the best option. The selected site (A) is located near the wharf, and its environment is already altered by the deposition of blast rock (Appendix 3: Drawing of Sediment Disposal Site). To create the disposal site, a geotextile membrane would be installed, and a sediment pond and drainage ditch would be constructed to collect the runoff before it re-enters Deception Bay. The dredged sediments would be transported by truck over a distance of approximately 850 m. The choice of this site would not require the construction of any access roads. During the dredging period, the proponent estimates that four trucks per hour would be required to transport the dredged material.

3.3 Shipping

The ore carriers that the proponent plans to use have a maximum capacity of 25,000 tonnes and are approximately 190 m long. The proponent estimates that nine trips will be made each year between mid-June and mid-March. This is the shipping period that has been agreed upon with the Inuit and that is specified in the certificate of authorization issued by the Quebec Department of Sustainable Development, Environment and Parks (MDDEP) in 2008. The proponent has indicated that CRI's ships will follow the same route in Deception Bay as Glencore Xstrata's ships.

With the three trips required to supply fuel and goods, CRI would make a total of 12 trips per year in Deception Bay, two of which would be in ice-covered waters. Beginning in 2013, there would be a roughly twofold increase in the number of trips, from the current 12 trips per year made by Glencore Xstrata to roughly 24 per year when CRI begins transporting ore.

3.4 Reliability of facilities

The proponent modified the wharf construction concept several times between November 2011 and May 2013, making changes to the wharf site and its design. The sediment management method and the location of the land-based disposal site have also been modified since the environmental impact statement was submitted in 2011. COFEX-N has a number of concerns about the reliability and stability of the port facilities, given the extreme wind and ice conditions that prevail in Deception Bay and the physical characteristics of sediments at the proposed wharf site. Similar concerns were also raised at the consultations.

COFEX-N asked the proponent for additional details on the new design concept for the wharf. In responses received on May 15 and June 11, 2013, the proponent stated that *the final design selected by the engineers for the port infrastructure in Deception Bay was based on a detailed characterization of the proposed site and surveys conducted in the summer of 2012, i.e. after the landslide, and that the site selected for the construction of the sheet pile cells was optimal, considering the nature of the bedrock and soils at the site as well as the constraints related to navigation.*

3.5 Proponent's project schedule

The latest project schedule, which was submitted to COFEX-N by the proponent on June 17, 2013, calls for commencement of the work required for dredging on June 23 and the start of construction of the permanent wharf on July 1, 2013.

According to that schedule, the permanent wharf would be operational by September 15, 2013. As indicated above, if the construction of the permanent wharf proceeds as expected, the construction of a temporary wharf, which would take two weeks, would no longer be required.

To reduce the potential effects of noise on marine mammals, the proponent has agreed not to do any drilling, blasting or pile driving between June 20 and July 15. During that period, only filling and dredging activities for the construction of the wharfs will be carried out.

4.0 CONSULTATIONS BY COFEX-N

4.1 May 2013

In 2013, COFEX-N held further consultations in the two Inuit communities most affected by the construction of the port infrastructure in Deception Bay. Public meetings were organized by COFEX-N in collaboration with the representatives of the two northern villages. The meetings were held in Kangiqsujuaq on May 6 and in Salluit on May 7. The high level of participation in the consultations reflected the strong interest of the communities in voicing their comments and concerns. Over 40 people attended the meeting in Kangiqsujuaq, and over 100 people took part in the meeting in Salluit. A meeting of representatives of the municipal councils and landholding corporations was held in both villages in advance of the public meetings.

Representatives of Fisheries and Oceans Canada and Transport Canada took part in the consultations, while representatives of the Nunavik Marine Region Impact Review Board (CRMNER) and the Kativik Environmental Quality Commission (CQEK) attended as observers. Following the presentations made by COFEX-N, DFO and Transport Canada, CRI presented a project update. The participants were then invited to ask questions or make comments. The Kativik Regional Government presented a brief in both villages and submitted it in writing to COFEX-N.

A large number of concerns and questions regarding a variety of points were raised. They are grouped by issue in the table below.

Issue	Concern
New wharf design – Choice of site	Stability of the new facilities given the landslide of 2011 Resistance of the wharf to wind and ice
Impacts of previous incidents	Will the biological productivity of the area recover following the landslide? Impacts of a spill from sulphuric acid drums. What action will the proponent take to correct the situation? CRI is responsible for taking action.
Management of ballast water	Introduction of invasive alien species through ballast water discharge Where will ballast water be discharged vis-à-vis the two villages and Deception Bay?
Proposed fish habitat compensation	Involvement of local authorities in discussions on proposed fish habitat compensation projects Financial compensation preferred over a fish habitat compensation project
Impact of work	Dredging carries a risk of sediment contamination due to leaks or accidental spills Dredging will cause sedimentation, which will have impacts on fish using the bay in summer. Will silt curtains be installed to reduce sediment plume dispersion? Update information on dredging work and disseminate the updated information Driving of sheet pile and pilings and blasting operations will cause noise, which will have impacts on the activities of marine mammals present in the bay. Request for compliance with the restriction period to avoid noise before July 15
Impacts of wharf	Will trucking the concentrate to the wharf generate nickel dust in the

operation	village and in Deception Bay? Will water and sediments in the bay be contaminated during wharf operations (transshipment by conveyor)? Adverse impacts of shipping: o on marine mammal populations, specifically ringed seal breeding and beluga whale migration, two economically important subsistence species o on the use of the ice bridge in winter to travel to harvesting sites on the other side of the bay
Financial compensation	Impacts on harvested species (waterfowl, marine mammals, fox) will reduce the harvesting potential and result in the loss of some resources. Financial compensation should be provided for losses, given that these resources are a source of food, clothing, etc. for the Inuit. Financial compensation should be provided for the loss of access to the ice bridge for subsistence harvesting due to shipping Situation of training programs and employment in the mine for the two communities; has provision been made for compensation?
Relations with the proponent	Desire has been expressed for relations with the proponent to remain cordial, open and transparent, and for ongoing communications with village representatives Access to the wharf and surrounding area must be maintained for members of the two villages, who are the users of this area. The proponent must inform the representatives of the two villages of any incident that occurs at the project sites
Project follow-up	An independent committee must be established to ensure follow-up during construction and operation. Meetings should be held every three months, and follow-up reports should be submitted to federal, provincial and KRG authorities.
Alternative means of transporting concentrate	Possibility of using a mode of transportation other than boats Sharing the existing Glencore Xstrata wharf

The minutes of the meetings of May 6 and 7, 2013, in Kangiqsujuaq and Salluit will be posted on the James Bay and Northern Quebec Agreement's registry website at: http://www.acee-ceaa.gc.ca/default.asp?lang=En&n=87D23076-1.

4.2 February 2008

In reviewing the project, COFEX-N also considered the concerns expressed at the initial consultations held in 2008 on the Nunavik Nickel project.

The public consultations held by COFEX-N and KEQC on February 25–28, 2008, in Salluit, Kangiqsujuaq and Puvirnituq provided an opportunity for residents to ask questions and express their main concerns about the project. Briefs were presented by the northern villages and landholding corporations of Salluit and Kangiqsujuaq, as well as by Makivik Corporation and the Kativik Regional Government. Those concerns are summarized below.

With respect to the work planned for the Deception Bay region, the participants spoke of the major impacts affecting the Inuit in the region: increased road traffic, which generates dust and pollution; increased shipping, which affects winter travel in the bay; construction of a second wharf rather than sharing existing facilities (wharf, airport, roads); sediment contamination by residual asbestos from the Asbestos Hill mine; and the disturbance of marine mammals by noise pollution. The organizations and local residents were strongly in favour of CRI sharing the existing wharf used by Glencore Xstrata.

Concerns were also voiced regarding the vulnerability of the facilities (wharf, conveyor, storage facility) to potential avalanches and landslides. The proponent was asked to provide a rigorous environmental follow-up program and a more thoroughly documented assessment of the cumulative impacts that also takes Glencore Xstrata's expansion projects into account.

With respect to the project's socio-economic benefits, the consultation participants pointed out that increased access to the area would benefit primarily authorities and mine employees, not the Inuit of nearby villages. In their view, the benefits of CRI's project in terms of job creation were minor compared to the benefits provided by Glencore Xstrata's Raglan project.

5.0 DESCRIPTION OF THE BIOPHYSICAL ENVIRONMENT, IMPACTS, MITIGATION MEASURES AND RESIDUAL EFFECTS

5.1 Hydrodynamics and water quality

Description

In the fall of 2012, current meter surveys and two-dimensional numerical hydrodynamic simulations of Deception Bay were conduct to describe the hydrodynamic behaviour of the bay, assess the impacts and presence of the wharf on hydrodynamic behaviour, anticipate maintenance dredging requirements and assess the impacts anticipated over the course of the work. These studies were used to assess the dispersion and dilution of sediment plumes generated by dredging activities.

The results of the model simulations show predicted concentrations exceeding 25 mg/L beyond a 300-m radius of the work area. After 25 days of work, it is estimated that total suspended solids (TSS) concentrations would be 100 mg/L within 375 m of the work. With

sustained winds of 30 km/h, concentrations would exceed 300 mg/L. The sediment plume is heavily influenced by winds, which are generally high in the bay.

As described in the 2012 EIS, the water is crystalline: *"the natural sedimentary deposit is low in comparison to the size of Deception Bay, which means there is very little matter in suspension"*; "*very low turbidity water"* (generally less than 5 mg/L).

According to the 2012 EIS, there appears to be no sedimentation at site Q1; the sector is not subject to accretion (sediment loading is limited in the bay).

Impacts

The wharf layout would have very little impact on current flow since the water will be able to flow freely along the shoreline, allowing for continued sediment transport. The impact of the wharf layout is therefore considered low.

The dredging required to install the temporary and permanent wharfs (driving of sheet pile and pilings) will place a large quantity of sediment into suspension in the crystalline waters of the bay. This will result in significant turbidity on a continuous basis over a long period of time, i.e. almost the entire summer season, which corresponds to the production season in this region. Water quality will be affected on a site-specific basis and the effect will be localized.

With land-based sediment management, runoff from dredged sediment stockpile areas could contaminate freshwater surface waters.

Mitigation measures

Apart from the best practices that the proponent intends to implement during the work to minimize the impacts of TSS on water quality (see datasheet PI4, Genivar 2012), and the use of an environmental clamshell bucket for dredging, no other measures can be taken. It is unlikely that the proponent will be able to ensure compliance with the water quality guidelines of the Canadian Council of Ministers of the Environment (CCME) in Deception Bay. The proponent has demonstrated that containment curtains, bubble curtains and the use of other dredging techniques will not be effective in reducing TSS concentrations generated during the work. In order to document the actual conditions of the environment during the work, the DFO has issued certain conditions related to TSS monitoring that must be met by the proponent.

At the land-based sediment disposal site, the proponent is planning to install two sediment basins and drainage ditches to collect runoff in order to return it to Deception Bay. It is also planning to install sediment traps to collect fine suspended sediments. With these measures, no impacts are anticipated on the quality of water returned to the bay.

Residual effects

The residual effect on water quality is considered to be nonexistent, given the small volume dredged, the planned use of an environmental clamshell bucket, the use of best dredging practices and the fact that no sediments will be disposed of in the bay.

5.2 Sediment quality

Description

Physicochemical characterizations were performed in 2006–2007 at site Q1 and in 2011 at site Q2, with sampling of nine stations each time. The results of the three characterizations show no exceedances for petroleum hydrocarbons, PAHs or PCBs. A number of exceedances of the Canadian sediment quality guidelines for copper and chromium were observed, and chrysotile asbestos was found in sediments (believed to be from the Asbestos Hill mine at Purtuniq, where asbestos transshipment activities were carried out between 1972 and 1984).

Following the changes to the wharf design, CRI performed another physicochemical characterization in the summer of 2012, with more exhaustive sampling of 32 stations. The results were analyzed on the basis of the *Canadian Sediment Quality Guidelines for the Protection of Aquatic Life* and the *Criteria for the Assessment of Sediment Quality in Quebec*. In view of the land-based sediment management approach adopted, the results were also compared against the criteria of the *Soil Protection and Contaminated Sites Rehabilitation Policy* of the MDDEFP.

Only metals were analyzed in the characterization performed in 2012:

- Samples exceeding the OEL[1] for copper and chromium: these values are below or very close to soil background concentrations for this region; the samples were collected near the shore.
- One sample exceeded the PEL[2] for zinc and one sample exceeded the OEL for zinc.
- The high values for zinc in this region are difficult to explain (no known natural sources or human activities that generate zinc in the proximity). Moreover, the exceedances were measured in the deep layers (up to 10 m).
- Most of the exceedances were observed between criteria A and B (MDDEFP policy): the sediments can therefore be used as fill material on any industrial land, provided their use does not increase the level of contamination. The selected disposal site is already used for industrial purposes (rock blasting and storage).
- One observed exceedance (zinc concentration in one sample) is in the B-C range (same used as for A-B range).

Impacts

In the sediment characterization performed in 2007, CRI noted the presence of chrysotile asbestos in the sediments. In the environmental impact assessment of 2008, it was estimated that there was no risk of air contamination by asbestos since the marine sediments were to be disposed of at sea and would therefore remain wet. Airborne asbestos is only a problem when sediments are dry. Given that the sediments to be dredged are located essentially at the same site as that sampled in 2007, it is highly likely that they contain chrysotile asbestos. In the option proposed by the proponent, the dredged sediments will be disposed of on land, which will mean that the asbestos will become airborne.

[1] Occasional effect level
[2] Probable effect level

With respect to the presence of copper, chromium and zinc in the sediments, no impacts are anticipated at the land-based disposal site.

Mitigation measures

During dredging operations, the proponent must ensure that sediments are kept wet at all times at the land-based disposal site in order to prevent chrysotile asbestos from becoming airborne.

Once the dredging operations are completed, the proponent must cover the disposal site to prevent the dispersion of airborne particles that could contain chrysotile asbestos.

Residual effects

Given the above mitigation measures, no residual effects are anticipated.

5.3 Fish

Description

Arctic char, Greenland cod, Arctic cod, sculpins and sticklebacks are the main species present in Deception Bay. The species most likely to use the littoral zone, where site Q1 is located, for feeding and reproduction are Arctic char, sculpins and sticklebacks. Some species, such as shorthorn sculpins, daubed shanny and grubbies, may use shallower areas.

In the survey conducted by CRI in the fall of 2011, the following fish species were observed at sites Q1 and Q2: daubed shanny, Arctic shanny, rock gunnel, grubby, sculpins, Arctic staghorn sculpin and mustache sculpin. Arctic eelpout, American plaice and Atlantic cod were also harvested in September 2007.

Arctic char uses the bay as summer feeding grounds and migratory corridors. It feeds on a wide variety of invertebrates and fish. It begins its downstream migration during ice break-up in late spring or early summer and returns to the river estuary in August to spawn and to freshwater in September. This species is highly prized by Inuit communities.

The presence of kelp beds in the sector of the port facilities suggests that the site may be used for refuge and as nursery and feeding grounds by a number of fish species that occur along the coast (fourhorn sculpins, shorthorn sculpins, grubbies, Arctic char, Greenland cod) and as a reproduction site for forage species (sticklebacks) that serve as prey for other species.

Impacts

The construction of the two sheet pile cells at the site of the permanent wharf will result in permanent encroachment in the bay, namely the destruction of kelp beds that can be used as refuge habitat and as nursery and feeding grounds by several fish species that occur in coastal areas and as breeding grounds by forage fish species that serve as prey for other species.

The placement of fill and riprap at the base of the two cells will also result in encroachment, partly in the area above the higher high water mean tide (HHWMT), partly in the intertidal

zone (between the HHWMT and chart datum) and primarily in the area below zero chart datum.

The encroached area above the HHWMT will become a terrestrial environment. The impact caused by the placement of the fill on this area is considered fish habitat destruction. The impact on the area above zero chart datum will cause permanent encroachment and will significantly alter the environment (bathymetry and substrate), almost completely eliminating its fish habitat functions through exposure to ice and the elements (wind, cold). The impact on this area is considered fish habitat destruction.

The fill zone below zero chart datum will result in modification of the substrate due to the replacement of unconsolidated material with rock. The impact on this area will be the harmful alteration of fish habitat. The area affected is an expanse of kelp beds that may be used as refuge habitat and as nursery and feeding grounds by a number of fish species that occur along the coast (Arctic char, fourhorn sculpins, shorthorn sculpins, grubbies, Greenland cod) and as breeding areas by forage species (sticklebacks) that serve as prey for other species. This area also serves as habitat for blue mussels, a species harvested by the Inuit.

The permanent wharf will require the installation of two pilings and the placement of riprap at their base. The resulting encroachment will alter the intertidal zone, causing destruction of fish habitat.

During dredging, which will be carried out 16 hours a day for 30 consecutive days, TSS concentrations could have adverse effects on juvenile fish present in the area by reducing the density of food resources. TSS can also affect feeding behaviour, specifically in blue mussels, which feed on plankton in the water column. It is estimated that the presence of suspended solids will reduce the amount of light penetrating the water column, thus disturbing activities that depend on light, such as photosynthesis and foraging. In addition, the organisms present in Deception Bay, such as soft corals, are not well adapted to high TSS concentrations. Light penetration in Deception Bay appears to be high given the presence of kelps at depths of over 45 metres.

Dredging will cause significant disturbance over a prolonged period of time due to the high clay content of the sediments. According to the hydrodynamic modelling of the bay, the clay sediments can take approximately 30 days to settle on the bottom. Given the one-month duration of the work and the 30-day sediment settling period, this disturbance would last a minimum of two months as the techniques proposed by the proponent have limited environmental effectiveness (excavator and environmental clamshell bucket). Given that the biologically productive season in northern waters is short, i.e. approximately two months, the disturbance will last for a period corresponding to the entire biologically productive season, which will have a significant impact.

Another impact on fish and benthic invertebrates is the introduction of invasive alien species. At the consultations held in the two communities visited, a number of concerns were raised regarding the possible introduction of such species to Deception Bay. Because most of the vessels chartered by CRI will come from Europe, there is a high probability that invasive alien species will be introduced into the waters of the bay. This issue is also a problem at major marine ports elsewhere in Canada. Invasive alien species could be introduced into the waters of Deception Bay through ship ballast waters or simply from the hulls of the ships, to which they attach themselves. Once they enter a new environment, they can become invasive—

particularly if no predators exist—and can negatively affect native species. The barges that will be used during wharf construction (if they come from marine waters) could also bring invasive species in with them. Three or four barges will potentially be used during in construction and dredging activities. Algal communities may proliferate on the barges because they remain stationary at the same location for very long periods of time. They can grow to a thickness of five to six inches on the hulls of the barges. These algal communities can include invasive species, such as sea squirts, epiphytes and tunicates.

Mitigation measures

In light of the harmful alteration and destruction of fish habitat, the proponent must carry out a compensation project. It must be submitted to DFO and approved before wharf construction work can begin.

With respect to the impacts caused by TSS concentrations, the mitigation measures mentioned in section 5.1 are applicable.

With respect to invasive species, the proponent must comply with the *Ballast Water Control and Management Regulations* and with the directives set out in the authorization issued by TC. The proponent will have to implement the measures already planned, i.e. performing ballast water exchange in the middle of the ocean and monitoring ballast water by sampling for analysis purposes when the vessels arrive at the wharf at Deception Bay.

If the barges used for construction have transited through international waters, the proponent will also have to ensure that their hulls are cleaned before they are brought into Deception Bay.

Residual effects

In light of the available information and given that mitigation measures will be implemented, no significant residual effects on fish species are anticipated.

5.4 Benthic communities

Description

In the 2011 surveys, 37 taxa were identified at site Q1 and 47 at site Q2. Barnacles, Greenland cockles, scarlet psolus (sea cucumber), periwinkles, blue mussels, clams, Iceland scallops and sea peaches were the dominant organisms observed at both sites. High densities of blue mussels were observed at site Q1 during the snorkel sampling carried out to depths of 2.4 m. Several other species, including spider crabs, starfish, urchins, whelks and northern moon snails were also observed at site Q2. In the 2012 surveys, 40 taxa were recorded at site Q1 and 57 at site Q2. Mean organism density was 12,237 individuals/m^2 at site Q1 and 28,154 individuals/m^2 at site Q2. Density at site Q1 is the same as in previous sampling programs.

In the 2011 survey, the at-sea disposal site selected (IM-2) showed a higher abundance of organisms than the other sites studied. The presence of anemones, sea potatoes, sea peaches, barnacles and soft corals were observed at that site. Corals are fragile organisms (very slow

growth rate (mm/year), delayed sexual maturity, low recruitment) and are known to serve as feeding, nursery and refuge habitats for a number of fish species. These habitats contribute to the complexity of the habitats present in the sector. The importance and fragility of these habitats has been documented (Boutillier, J. et al, 2010); they are highly vulnerable to any change in the environment, the organisms identified above being particularly sensitive to suspended sediments. The United Nations General Assembly Resolution 61/105 on sustainable fisheries was adopted in December 2006 with Canada's support. This resolution calls upon all States to apply, directly or through regional fisheries management organizations and arrangements:

- precautionary, conservation and management measures to protect vulnerable marine ecosystems, including corals and cold water sponges, from significant adverse impacts; and
- the ecosystem approach to sustainably manage fish stocks.

Impacts

A ship manoeuvring area of approximately 24,000 m^2 will be created. Ship manoeuvring at the wharf will be carried out such that benthic communities will be constantly impacted and will continue for the entire life of the infrastructure. In 2008, Fisheries and Oceans Canada authorized destruction of habitat for the construction of the jetty and harmful alteration of habitat for the installation of a new ship manoeuvring area. The subarctic landslide in 2011 resulted in the harmful alteration of part of the existing habitat. This sector did not have time to be recolonized by a stable benthic community, as existed prior to the work in 2011. For that reason, the manoeuvring area that will be created following the work planned under this project will not result in any additional losses.

The high TSS concentrations will have impacts on benthic communities. As indicated by the plume dispersion modelling in the 2012 EIS, TSS could be carried over large distances and slowly settle in the bay, thus affecting benthic organisms.

Invasive alien species, introduced through ballast water and via the hulls of ship and barges, would also have impacts on benthic species (the same as in section 5.3).

Mitigation measures

The same mitigation measures apply for benthic invertebrates as for suspended solids (section 5.1) and invasive alien species (section 5.3). Moreover, as indicated in section 5.3, the fish habitat compensation project will result in the recolonization of benthic invertebrates.

Residual effects

In light of the available information and given that mitigation measures will be implemented, no significant residual effects on benthic invertebrates are anticipated.

5.5 Marine mammals

Description

Roughly a dozen marine mammal species may be present in Deception Bay, six of which are of particular interest to the Inuit: beluga whale, bowhead whale, minke whale, ringed seal, harp seal and bearded seal. The bay is also used by narwhals, killer whales and harbour seals.

The most common cetacean species in Deception Bay are beluga whales, minke whales and bowhead whales. Narwhals and killer whales are only very occasionally observed. According to the Inuit, narwhals are now less abundant and less frequent than they once were. Moreover, its range does not include Deception Bay. With respect to killer whales, their presence in the bay is more frequent than in the past, but varies from year to year.

Three beluga whale populations are likely to visit and use Deception Bay, namely the western and eastern Hudson Bay populations and the Ungava Bay population. Belugas are hunted by the Inuit of Salluit and Kangiqsujuaq and may be present in Deception Bay year-round (FHAMIS). However, they are more abundant during their spring and fall migrations. During the breeding season in the spring, belugas leave their wintering grounds in the Hudson Strait and migrate along the coast west to Hudson Bay or east to Ungava Bay, where they spend the summer. During the summer, they congregate in the calm, shallow waters of bays and estuaries to feed, particularly female belugas and their calves, which prefer calmer, warmer waters. According to Inuit hunters, some belugas spend the summer in Deception Bay and make incursions into the bay in winter. Calving reportedly occurs between April and June. In the fall, they return to their wintering grounds in Hudson Strait. According to Hammill and Lesage (2009), belugas are abundant in eastern Hudson Strait from about June 15 to July 15 and in the fall starting around October 15. Echolocation calls emitted by belugas are mostly in the frequency range of 1–20 KHz, with amplitudes of 100–180 dB (re: 1µPa at 1 m).

Minke whales are apparently frequently observed in Deception Bay. In early 2000, several individuals were observed by the Inuit in Deception Bay. Little is known about the species' seasonal movements. Minke whales are not hunted by the Inuit.

According to local Inuit and aerial surveys, bowhead whales occasionally use Deception Bay and their numbers are increasing. This species prefers bays, straits and estuaries. In the summer, the western population travels to the Beaufort Sea and the Arctic Ocean. From the fall to the spring, they migrate to Alaska. The pods migrate north and south, following ice movements. Low-level subsistence hunting of the species by the Inuit is reported.

Ringed seals and harp seals are the most abundant and most hunted pinniped species in Deception Bay, with bearded seals being much less abundant. These species use Deception Bay primarily in the summer, where they feed along the coasts (July and August for ringed seals). Some species, such as bearded seals, migrate up rivers at high tide to look for fish (July and August). It is likely that harbour seals will occasionally be observed inside the bay because there is a feeding area in the Hudson Strait where this species congregates along the coast between Sugluk Bay and Deception Bay (FHAMIS). Atlantic walruses are also likely to occur in Deception Bay. This species migrates eastward in the Hudson Strait in the spring and westward in the fall. However, according to the Inuit, it is considered to be relatively rare in the bay.

In the survey conducted between July 13 and September 30, 2011, which coincided with the work at site Q1, 193 pinnipeds were observed. No whale species were observed. In the acoustic surveys carried out in September 2012, belugas were observed in Deception Bay.

Impacts

The increase in underwater noise levels caused by pile driving, vibratory driving and possibly impact driving during construction of the temporary wharf is likely to cause disturbance to belugas, which feed in Deception Bay during migration.

In addition, winter shipping could have an impact on ringed seal breeding activities. The passage of ships during the period of ice cover breaks up the ice. Ice cover is essential to ringed seals as whelping, nursing and weaning habitat.

Mitigation measures

Work that generates noise or poses the risk of collisions will have to be terminated by October 15, the period corresponding to peak fall marine mammal abundance prior to ice formation.

The execution of pile driving work outside the restriction period, i.e. June 20 to July 15, will prevent disturbance to belugas during a feeding period that is important for their migration.

The implementation of a cetacean monitoring program during pile driving operations should prevent injury to cetaceans. Vibratory and impact pile driving will be halted immediately upon observation of a cetacean within a 1,200 m radius, and passive listening will be carried out during the work. Details of the monitoring program are presented in the section of the EIS on mitigation measures (Genivar 2012) and will have to be approved by DFO.

Shipping will be prohibited from March 15 to June 15. Only two trips will be authorized between December 15 and March 15 in order to limit impacts on Inuit hunting of ringed seals, which use pack ice as whelping, nursing and weaning habitat.

Residual effects

If the proposed mitigation measures are implemented as planned, no residual effects are anticipated.

5.6 Birds

Description

The area surveyed by CRI in 2012 encompassed the footprint of the project infrastructure and the periphery. A total of 41 bird species were observed within the study area, including two colonies of waterbirds. Breeding was confirmed for 27 species, including peregrine falcons (*Falco peregrinus*). The waterbird species observed were seen primarily at mouth of the Deception River, south of the bay. Landbirds are present throughout the area. Breeding

shorebirds were observed at the mouth of the Deception River, which is characterized by wet tundra, pools and ponds.

Some of the species observed are harvested by the Inuit of Salluit and Kangiqsujuaq, including snow geese, Canada geese, common eiders, black guillemots and rock ptarmigans.

Impacts

The work could disrupt the breeding season of certain species. It is important to bear in mind that there are many activities that pose a potential threat to a number of bird species. These activities, when carried out during the breeding season, can inadvertently lead to the destruction of migratory bird nests and eggs. The incidental take of nests and eggs is a violation of paragraph 6(a) of the *Migratory Birds Regulations*, which prohibits any person from disturbing, destroying or taking the nest or eggs of a migratory bird.

Mitigation measures

COFEX-N is aware that the season for certain work in Northern Quebec is short. However, the proponent must demonstrate due diligence in respect of its responsibilities under the *Migratory Birds Convention Act, 1994*, and associated regulations. The proponent plans to perform the work outside of the migration and breeding season. In addition, the work site at the wharf and land-based disposal site is already disturbed and would likely not be used for breeding.

Residual effects

No residual effects are anticipated if the mitigation measures are taken.

5.7 Aquatic vegetation

Description

In 2008, a survey of aquatic vegetation was carried out by the proponent along 3 km of shoreline in the sector of the port infrastructure. The survey revealed that all 268 stations are covered by algae on a permanent basis: 53% at a low density (less than 30% coverage), 35% at a moderate density (30% to 60% coverage) and 15% at a high density (over 60% coverage).

In the survey conducted by CRI in 2011, a larger presence of kelp was observed at site Q2 than at sites Q1 or Q3. The species most often observed at a depth of 2.5 m were hollow-stemmed kelp and sea colander. Closer to the shore, the dominant species are members of the genus *Fucus*, particularly Arctic wrack. Red algae and green algae were also observed, including sea oak and sea lettuce. Kelps were also observed at depths of over 45 m at the disposal site initially proposed, which had been documented at that time.

In 2012, the survey of aquatic grass beds identified seven different taxa, five of which are brown algae at sites Q1 and Q2. The survey results indicate higher aquatic grass bed cover at site Q2 than at site Q1. The analysis of the data and underwater photographs shows a clear dominance of brown algae of the family Fucaceae at site Q2, whereas site Q1 is dominated by

brown algae of the class Phaeophyceae. The percent cover by kelp species is similar at the two sites, ranging from 1 to 75% at site Q1 and 1 to 90% at site Q2.

A salt marsh is present near the estuary of the Deception River. It is regularly submerged by tides and is dominated by creeping alkali grass (*Puccinellia phryganodes*). The backshore (upper beach) is dominated by sea lyme grass in sectors where sand is present in the bay.

Impacts

During construction of the two sheet pile cells, aquatic vegetation will be destroyed at site Q1, as indicated in section 5.3. The extent of habitat destruction is significant.

Mitigation measures

Given the harmful alteration and destruction of fish habitat, a compensation project will have to be carried out by the proponent. The project must be submitted to DFO and accepted before the work can begin.

Residual effects

With the implementation of a fish habitat compensation project, no residual effects are anticipated.

5.8 Species at risk

Description

The peregrine falcon is the only at-risk bird species that is likely to occur in the study area. The golden eagle, which is also at risk, has also been observed near the study area, but not in it.

Four plant species, all likely to be designated threatened or vulnerable in Quebec, have been observed in the study area: smooth northern-rockcress (*Braya glabella* ssp. *glabella*), dwarf hairgrass (*Deschampsia sukatschewii*), bluff cinquefoil (*Potentilla arenosa* ssp. *chamissonis*) and Vahl's cinquefoil (*Potentilla vahliana*).

With respect to land mammals, the following species were observed: wolverine (on the list of threatened or vulnerable species in Quebec and considered endangered under the *Species at Risk Act* (SARA), least weasel (on the list of threatened or vulnerable species in Quebec) and polar bear (on the list of threatened or vulnerable species in Quebec and considered a species of special concern under SARA).

Impacts

Peregrine falcons are believed to breed in the study area but were not observed in the work area. This species can avoid areas of disturbance.

Smooth northern-rockcress is the only species observed along the shoulder of the road, near site Q1, which is a heavily used anthropogenic site. The other species were recorded in areas that will not be directly affected by the work.

The status of the polar bear is of concern. The increase in ship traffic during winter will pose a risk of fragmentation of its habitat (pack ice).

Mitigation measures

In terms of the vascular species, the mitigation measures proposed by the proponent are sufficient if applied at site Q1.

With respect to the fragmentation of pack ice caused by the passage of ships, the mitigation measures related to navigation proposed by the proponent must be applied, namely reduced ship speed, use of the same course as ships going to the wharf of Glencore Xstrata, synchronization of ship passages between the two mining companies, creation of an ice bridge following passage of the ships, etc. In addition, the restriction on shipping in Deception Bay between mid-March and mid-June must be respected.

Residual effects

If the mitigation measures are taken, no residual effects are anticipated.

6.0 DESCRIPTION OF THE HUMAN ENVIRONMENT, IMPACTS, MITIGATION MEASURES AND RESIDUAL EFFECTS

6.1 Communities affected

The assessment of the social impacts of the project is based on an update of the 2007 reports using 2011 census data. Interviews with the residents of one of the two most affected communities could not be carried out within the framework of the study by CRI.

The components of the project being studied, namely the port facilities and sediment disposal site, are located in Deception Bay, in the northern part of the Nunavik area, roughly 50 km east of the village of Salluit and roughly 170 km northwest of the village of Kangiqsujuaq. Another community, Puvirnituq, located on the coast of Hudson Bay, is not directly affected by any specific component of the project, although it is affected by CRI's overall mining project.

The northern villages of Salluit and Kangiqsujuaq are the local municipalities that manage public services, such as waste management, within the administrative boundaries. The landholding corporations—Nunaturlik in Kangiqsujuaq and Qaaqalik in Salluit—administer Category I and II lands on behalf of beneficiaries, specifically aspects relating to land use and harvesting activities for non-beneficiaries.

The study area is located on Category II lands (administered by the Qaaqalik landholding corporation) and Category III lands, pursuant to the land regime described in the JBNQA.[3] The Inuit have exclusive hunting, fishing and trapping rights on these lands.

The facilities themselves are located on Category III lands. These lands are provincially owned lands for which the regional government, namely the Kativik Regional Government, acts as the local municipality. Its mandate includes renewable resources, the environment, land use planning and employment and training. The Makivik Corporation, on the other hand, is an ethnic organization that oversees the implementation of the JBNQA. Its mandate includes the protection of Inuit rights and culture as well as the natural environment, and it is a partner in the region's economic development.

6.2 Use of the area

Description

Deception Bay is identified in the land use master plan adopted by the Kativik Regional Government[4] as a critical area for subsistence activities. The site is still used extensively by the Inuit of the two communities as a source of supplies, as well as for aspects related to culture and identity (transmission and maintenance of traditional knowledge, language, etc.). The sector has very real and significant symbolic value for the communities, which is reflected in the active use of the site.

There is little permanent infrastructure (a single permanent Inuit camp) and few archaeological remains at the specific site where construction will take place. However, a number of families and community members use the sector year-round.

Impacts

The proponent's analysis of the impacts relating to the use of the area for traditional purposes underestimates the extent of the project's impacts. Although the footprint of the port facilities and sediment disposal site is relatively small, the analysis of the impacts associated with the construction work and use of the infrastructure as described in the environmental impact statement does not fully recognize the importance of the sector for uses other than industrial activity. COFEX-N is of the view that the impacts are more significant than what is indicated in the report. Some impacts are already beginning to be seen, such as wildlife habitat loss, and are having indirect effects on the communities, including reduced access to resources.

The construction work and road transportation activities during the construction and operation phases will increase the amount of fine particulates and dust in the sector, including near the work site, along roads and at the dredged sediment disposal site and possibly at greater distances

[3] James Bay and Northern Quebec Agreement

[4] KRG. 1998. *Master plan for land use in the Kativik region: general aims of land development and general land use policies*. Kativik Regional Government, Environmental and Land Use Planning Department, Kuujjuaq. 49 p.

during periods of higher winds. Increased dust levels were identified by the two communities as a major concern. They are worried about the effects on the plants and berries they harvest. It is also a concern because the sector is used for drying fish in the months of July and August. COFEX-N notes that the proponent did not address this issue in the EIS.

Mitigation measures

To mitigate this impact, it is recommended that the roads and sediment disposal site be kept wet to reduce dust. The sediment disposal site will also have to be covered with a membrane on completion of the work (see recommendation section 5.2 – Sediment quality).

Monitoring of the dust generated and particulates deposited will have to be carried out at different locations (roads, soils, harvested plants and fruit, fish drying locations), and the data will have to be transmitted to regional and local authorities. If the monitoring shows evidence of contamination, further measures will have to be taken.

Residual effects

If these mitigation measures are taken, it is anticipated that there will be few residual effects.

6.3 Access to the area

Description

Access to the region is limited. According to the proponent, goods and ore concentrate will be transported primarily by ship.

Impacts

Apart from the risk of collisions and leaks, the increased frequency of shipping will have an impact on ice cover and, as a result, on access to the area by the Inuit for subsistence activities. This will be exacerbated by the effects of climate change on the ice regime, specifically a shorter season, thinner ice cover and increased presence of moving ice. It will take more time for the ice cover to recover and to be safe for travel.

Mitigation measures

Coordination of navigation by the two companies will be extremely important, as will regular communication with the two communities in order to inform them in advance of the passage of ships. This will enable the Inuit to plan their movements within the area so as to limit the extent of the impacts.

COFEX-N stresses the importance of strictly adhering to the shipping restriction period, i.e. March 15 to June 15, and of ensuring that emergency situations under which the restriction can be lifted are communicated to the two communities and receive formal written authorization from

the authorities of the two communities. Moreover, in light of climate change, it is recommended that monitoring be conducted to verify whether wildlife behaviours (migration patterns, seal whelping period, etc.) adjust to climate change and that the dates be modified to correspond to the most appropriate period for the species affected.

Residual effects

If the mitigation measures are taken, the residual effects will be reduced.

6.4 Economic development

Description

The economy of the region, and particularly that of the communities, is based in part on subsistence activities and on the service sector. The mining sector also accounts for a small share of the region's economy, through employment at mines or exploration sites, and primarily through companies that subcontract mining operations. Commercial hunting and fishing activities and tourism also contribute to the region's economy (the Pingualuit provincial park is near the village of Kangiqsujuaq and south of the mine development).

Impacts

The project will have impacts on the region's economy, particularly for the communities of Salluit and Kangiqsujuaq. The construction phase could have positive impacts in that businesses in the communities will receive subcontracts and non-residents heading to the mine will pass through the villages (accommodation, food, services, etc.). In this regard, the agreement signed for the Nunavik Nickel project (NNiP Agreement) provides for a framework for awarding contracts.

However, the overall project provides little value added or significant benefits since no ore processing will be carried out in the region, or even in the country. In addition, given its layout, the port infrastructure cannot be effectively used for any purpose other than the transshipment of ore. The environmental impact statement appears to overestimate the benefits of the project to the region, which are limited.

Mitigation measures

If the agreement is implemented and the conditions regarding the awarding of contracts are met, COFEX-N concludes that there will be no residual negative effects. CRI will have to take compensation measures to offset the fact that the facilities cannot be shared. It will also have to provide compensation for losses generated by the importation of products from the North Sea, which will directly affect the region's economy (e.g., petroleum).

Residual effects

Given the mitigation measures that will be taken, the residual effects will be reduced.

6.5 Hiring of personnel

Description

With respect to the hiring of personnel by CRI for the construction and operation phases, the NNiP agreement makes provision for giving priority to Inuit employees from the two communities in hiring decisions and sets out a minimum hiring rate (proportion) to be met.

Impacts

The education level in the area is very low (academic achievement, graduation rate, etc.), which limits access to jobs, particularly professional or executive positions. As a result, real access to jobs will only occur over time provided sustained efforts are focussed on worker training. Another mining development in the region (Xstrata Nickel's Raglan Mine), which has been in operation since 1998, has not yet reached the minimum Inuit hiring rate (set at 20%), despite ongoing efforts to contribute to worker training.

There are other issues that affect worker hiring and retention in the region. For example, it is very difficult to find candidates who are willing to work under the proposed conditions, which require being away from the community for several weeks at a time.

As a result, the positive impacts identified by CRI in the environmental impact statement may not easily materialize in the short term.

Mitigation measures

Above and beyond the proposed measures, it is recommended that CRI provide working conditions that are better suited to regional realities and needs and support programs aimed at ensuring better integration and retention of Inuit employees. Tamatumani[5] is an example of a program that contributes to improving the rate of Inuit employees in the mining sector in the region.

Residual effects

If the mitigation measures are implemented and maintained over time, it is anticipated that the project will have positive economic effects.

6.6 Health

Description

Profound changes associated with sedentary lifestyles and modernization of Inuit society bring with them health problems and diseases. A more traditional diet can prevent some of these

[5] Reference: http://www.xstratanickelraglan.ca/EN/Commitments/Pages/Tamatumani.aspx

problems and promote better overall health. The project will, however, alter the natural environment.

Impacts

The construction, operation and modification phases may also have health impacts. They are more direct in terms of the risk of worker accidents or collisions. However, there are indirect risks caused by the effects on plant and animal species, on which the communities depend for subsistence. These effects receive less attention in the environmental impact statement. A more traditional diet is very important to Inuit health.

Mitigation measures

The proposed mitigation measures cover only direct impacts. The measures set out in section 5 of this report, which are aimed at reducing the impacts on plant and animal species, will be important in reducing the indirect impacts on the population.

In addition to mining royalties, CRI will have to provide for compensation for the loss of food resources.

Residual effects

Given the mitigation measures that will be taken, the residual effects will be reduced.

7.0 CUMULATIVE IMPACTS

Industrial activities associated with mine operations have been carried out in Deception Bay since the 1970s. First, there were the port facilities of the Asbestos Hill asbestos mine, which was in operation from 1970 to 1984. Following that was the Raglan Nickel Mine, which has been in operation since 1998. The Inuit of Salluit and, to a lesser extent, those of Kangiqsujuaq, have been coexisting with industrial facilities and with the employees of these mining companies for over 40 years.

For the cumulative impacts of the work proposed by CRI, it is important to consider the period from 1970, when operations began at the Asbestos Hill mine, to the end of operations of the Nunavik Nickel mine by CRI. In considering this period, it is important to assess the permanent residual impacts added by the CRI project to existing impacts, as well as the impacts of other past projects or interventions.

7.1 Integrity of the area

With respect to the area's integrity and landscape quality, it is important to note the presence of the industrial infrastructure built in the past: an airstrip, deep-water wharf, storage facilities, oil depots, access road, and permanent and temporary camps. The existing CRI facilities, namely the

oil depot, concentrate storage facility and temporary camp, were built in 2011 and 2012. The integrity and landscape quality of Deception Bay have therefore already been affected.

Taken individually, the facilities of the various companies do not significantly reduce the area's integrity or landscape quality. However, when taken together, they impart an increasingly industrial character to the sector. This use is also inconsistent with other uses of the sector, including subsistence harvesting.

It has been mentioned many times by various stakeholders that CRI should have reached an agreement with Glencore Xstrata to use the same wharf, even if it meant having to make changes to accommodate joint use. COFEX-N agrees with this view. The construction of a second wharf was authorized by the regulatory authorities in 2008, but it is important to point out that it clearly has a permanent residual effect on the integrity of Deception Bay. This effect will no doubt be offset by the opportunity for the Inuit community to use the wharf, given the type of construction planned.

7.2 Use of the area

Deception Bay is an important hunting and fishing area for the Inuit of adjacent villages, particularly Salluit, which is less than 50 km away. Depending on the season, the Inuit hunt seals, beluga whales and waterfowl, gather mussels and scallops and fish for Arctic char and sculpin.

Increased shipping during mine operations clearly has a cumulative impact on the use of the area by the Inuit. If shipping by both mining companies is taken into account, annual traffic by large ships taking out concentrates and bringing in supplies will double (from at least 12 to at least 24 trips per year). Despite the efforts made by the two companies to reduce this impact, it remains high over the winter months. Ice cover is fragmented by the passage of ships, which affects winter travel in the bay by hunters, fishers and other users.

The addition of 12 trips per year could have a permanent cumulative residual effect on the use of the area. However, agreements exist between CRI and the northern villages respecting winter shipping restrictions, namely only two trips between mid-December and mid-March and no trips between mid-March and mid-June. Similar agreements exist for Glencore Xstrata, which has been operating in the region since 1998. As a result, if Glencore Xstrata and CRI can synchronize their winter shipping activities and use the same shipping routes as indicated by CRI, this cumulative effect could be manageable and would reduce disturbances for users of the area. Rigorous monitoring of this situation and of the ice cover should be carried out in order to readjust, as required, the winter shipping agreements with the two companies.

During the consultations held in 2013, one of the issues raised was the difficulty experienced by the Inuit in accessing the area near the existing industrial facilities, a situation that could get worse with the start-up of the transshipment and shipping operations. Concrete measures will have to be taken by CRI to meet the needs of the Inuit, and this situation will have to be monitored.

The cumulative effects of CRI's activities on the use of the area, particularly in respect of ice cover, could add to the effects of climate change and significantly affect the Inuit's ability to carry out their traditional activities in the bay. The Inuit access the area and their harvesting zones by means of ice roads. A warmer, shorter winter could restrict access or make travel more risky. The passage of ships breaks up the ice cover, which takes time to reform. Human pressure combines with climate change to modify habitats and species behaviour (migration patterns, etc.).[6]

7.3 Marine mammals

Marine mammals are an important food resource for the Inuit, and there are a number of species that occur in Deception Bay. Ringed seals and beluga whales are among the main species harvested in the bay.

During the operation of the mine, shipping could have cumulative effects on marine mammal populations. However, the risk of collisions between ships and marine mammals will remain small, and prohibiting shipping from March 15 to June 15 will provide for optimal conditions for breeding ringed seals.

There is a risk that climate change will affect marine mammal populations in Deception Bay by altering their habitat and access to food resources. Increased shipping in the bay could exacerbate the effects on the ice regime and pack ice caused by higher temperatures, a shorter winter season and changes in precipitation, ice and storm regimes.

It is recommended that follow-up be conducted to verify whether wildlife behaviours (migration patterns, seal whelping period, etc.) adjust to climate change and to modify the shipping restriction dates to correspond with the most appropriate period for the species affected.

7.4 Fish habitat

The environmental footprint of the port facilities in Deception Bay was reduced considerably from that of the original wharf design of 2011. Nonetheless, loss and alteration of fish habitat will occur, including a potential shellfish harvesting area.

For this reason, DFO is requiring the implementation of a compensation project that will consist essentially of a fish habitat enhancement within Deception Bay designed to create habitats targeting, where possible, fish species of interest to fisheries.

As a result, CRI's activities will have no significant cumulative impacts on fish habitat. However, DFO must obtain firm commitments from the proponent in terms of habitat compensation before authorizing changes to fish habitat.

[6] Tremblay et al. 2008. Available at http://www.ouranos.ca/media/publication/15_nei2008_accesressources.pdf

7.5 Effects of the environment on the project

According to various expert panels, climate change is affecting polar regions more quickly and more intensely than other regions of world. This is due specifically to feedback mechanisms, such as ice loss, which reduces the albedo effect and accelerates the process of warming by absorbing more heat at the surface of the land and water. Studies and observations confirm that the effects of climate change are already beginning to be felt in Nunavik.[7] The upward trend in temperatures is causing changes in the ice regime and storms and will lead to rising sea levels.[8] Increased shipping in the bay could exacerbate the effects on the ice regime.

Little basic data on water levels (storm surges) or climate conditions is available for the region. Therefore, the design of the infrastructure and the establishment of safety factors for this region are very complex. Climate change adds to the complexity because it will result in a decline in the ice cover that protects coastal zones, an increase in moving ice, and altered storm and wave regimes.[9] As a result, built infrastructure will be more frequently exposed to extreme conditions, which could increase their vulnerability. Improper design under such conditions could result in failure and could have environmental impacts. To reduce these risks, monitoring of the state of the infrastructure and preventive maintenance activities will be critical.

8.0 CONCLUSION AND RECOMMENDATIONS

The mandate given to COFEX-N by the Federal Administrator is to analyze the impact of the revised port infrastructure construction project in Deception Bay, including dredging and sediment management activities, as well as the impact of operating the facilities, including shipping.

After analyzing the project, COFEX-N is of the opinion that, provided the proponent implements its proposed mitigation measures and those recommended in this report and meets the conditions of the permits and authorizations issued by the regulatory authorities, the port infrastructure construction project in Deception Bay is not likely to cause significant adverse environmental or social effects.

However, COFEX-N is also of the opinion that, if necessary, the construction and use of a temporary wharf at the same time as the construction of the permanent wharf would generate an increased risk to the environment and use of the area.

Given the above, COFEX-N recommends that the Federal Administrator authorize the proposed project to construct and operate the port infrastructure, provided the following conditions are met:

1. To reduce the potential impact of increased winter shipping, the proponent shall rigorously implement the following measures:

[7] Ouranos, 2010
[8] Ouranos, 2010
[9] Clerc et al. 2012, and Quebec Department of Transportation, available at http://www.inframaritimes-nunavik-cc.mtq.gouv.qc.ca/Pages/Accueil.aspx

a. prohibit shipping between March 15 and June 15;
b. observe the restrictions applicable to winter shipping, specifically a maximum of two vessels between December 15 and March 15 and a maximum speed of 7 knots;
c. synchronize ship movements and the navigation route for the vessels of Glencore Xstrata and CRI; and
d. in an emergency situation, communicate with the villages of Salluit and Kangiqsujuaq before lifting the restriction on shipping between March 15 and June 15 and obtain formal written authorization from the authorities of the two communities.

2. The proponent shall review this winter shipping strategy annually to determine if it is the best strategy for reducing the impacts on the use of the bay by the Inuit. The review must take into account the marine activities of Glencore Xstrata and must be done in collaboration with the Inuit communities of Salluit and Kangiqsujuaq, KRG and Makivik Corporation.

3. The proponent shall establish an environmental monitoring and follow-up committee to oversee the application of the mitigation measures and environmental monitoring and follow-up programs during the construction and operation phases. The committee must comprise representatives of the proponent, KRG, Makivik Corporation, the northern villages of Salluit and Kangiqsujuaq, as well as representatives of interested regulatory authorities (NMRIRB, KEQC, COFEX-N, DFO, MDDEFP, TC).

4. For ballast water discharge from its ships, the proponent shall:
a. comply at all times with the *Ballast Water Control and Management Regulations*;
b. comply, as required, with the specific directives of Transport Canada and Fisheries and Oceans Canada concerning the region of Deception Bay; and
c. monitor ballast water through the collection and analysis of water samples from ships on their arrival at the wharf. The results of the analyses will have to be sent to the follow-up committee and to the appropriate authorities.

5. During the construction and operation phases, the proponent shall provide for the necessary resources to apply the mitigation measures set out in its *Environmental and Social Impact Assessment* (Chapter 8 and Appendix 21, November 2012) and in the additional documents transmitted to the regulatory authorities or in response to the consultations since December 2012.

6. The environmental monitoring and follow-up program provided for by the proponent in its *Environmental and Social Impact Assessment* (Chapter 9, Appendices 23 and 24, November 2012) will have to be updated to include the commitments made since November 2012. The proponent shall provide for the necessary resources to implement this program. A complete program will have to be submitted to the regulatory authorities and follow-up committee prior to its commencement.

7. Once completed, all environmental monitoring and follow-up reports produced must be transmitted to the regional, provincial and federal authorities. During the construction phase, the environmental monitoring report must be forwarded to the regulatory authorities at least twice a month. During the operation phase, the environmental follow-up report must be submitted at least once a year.

8. The proponent shall implement a compensation program for fish habitat losses caused by the work to be carried out in Deception Bay. The program (habitat enhancements in Deception Bay) must be approved by Fisheries and Oceans Canada prior to commencement of work.

9. During the entire construction and operation phases, the proponent shall implement an effective communications program with authorities and residents of the northern villages of Salluit and Kangiqsujuaq. The proponent shall maintain harmonious relations between the users of Deception Bay and CRI personnel and shall ensure that traditional access by the Inuit to the bay is not restricted.

10. Under previous agreements, the proponent had to guarantee public access to its wharf. As a result of the design selected, such access will likely be impossible and the adjacent villages will be unable to use the wharf or to transport goods to and from it. If a need is expressed by the villages affected, the proponent shall compensate for this situation.

11. The proponent should inform COFEX-N of any updates to the project schedule.

12. The proponent shall, very early in the process, hold talks with affected parties on the fate of the port facilities after the end of the operation phase. It shall ensure proper restoration of the sites or their transfer to local or regional authorities.

13. In addition to the mitigation, monitoring and follow-up measures set out in the proponent's impact assessment and supplementary documents, COFEX-N recommends the implementation of the following additional measures:
    a. If the barges used during construction come from marine waters, the proponent should ensure that their hulls are cleaned before moving them into Deception Bay.
    b. During the dredging period, the proponent should keep the sediments at the land-based disposal site wet at all times to prevent any risk of chrysotile asbestos from becoming airborne.
    c. Immediately on completion of the dredging operations, the proponent should cover the land-based sediment disposal site to prevent the dispersion of airborne particulates containing chrysotile asbestos.
    d. During the construction and operation phases, roads should be kept wet to reduce dust. In addition, monitoring of dust and particulate levels on the plants and fruits harvested and at locations where fish are dried will have to be carried out and the data transmitted to local and regional authorities.
    e. Where possible, the work should be performed outside the migratory bird migration and breeding season.
    f. The proponent should systematically inform the two Inuit communities of the passage of ships to enable them to plan their movements in the area.

g. CRI should identify concrete measures to meet the needs of the Inuit regarding access to Deception Bay and use of the infrastructure and services. Follow-up of this situation should be carried out and presented to the follow-up committee identified in recommendation 3.
h. CRI should verify with the follow-up committee mentioned in recommendation 3 the need for and approach to determining whether wildlife behaviours (migration patterns, seal whelping period, etc.) adjust to climate change in order to modify the shipping restriction dates as a function of the optimal periods for the species and use of the area.
i. It is recommended that CRI propose working conditions that are better suited to regional needs and realities and that it support programs aimed at improving integration and retention of Inuit employees. Tamatumani[10] is an example of a program that contributes to improving the rate of Inuit employment in the mining sector in the region.

[10] Available at http://www.xstratanickelraglan.ca/EN/Commitments/Pages/Tamatumani.aspx

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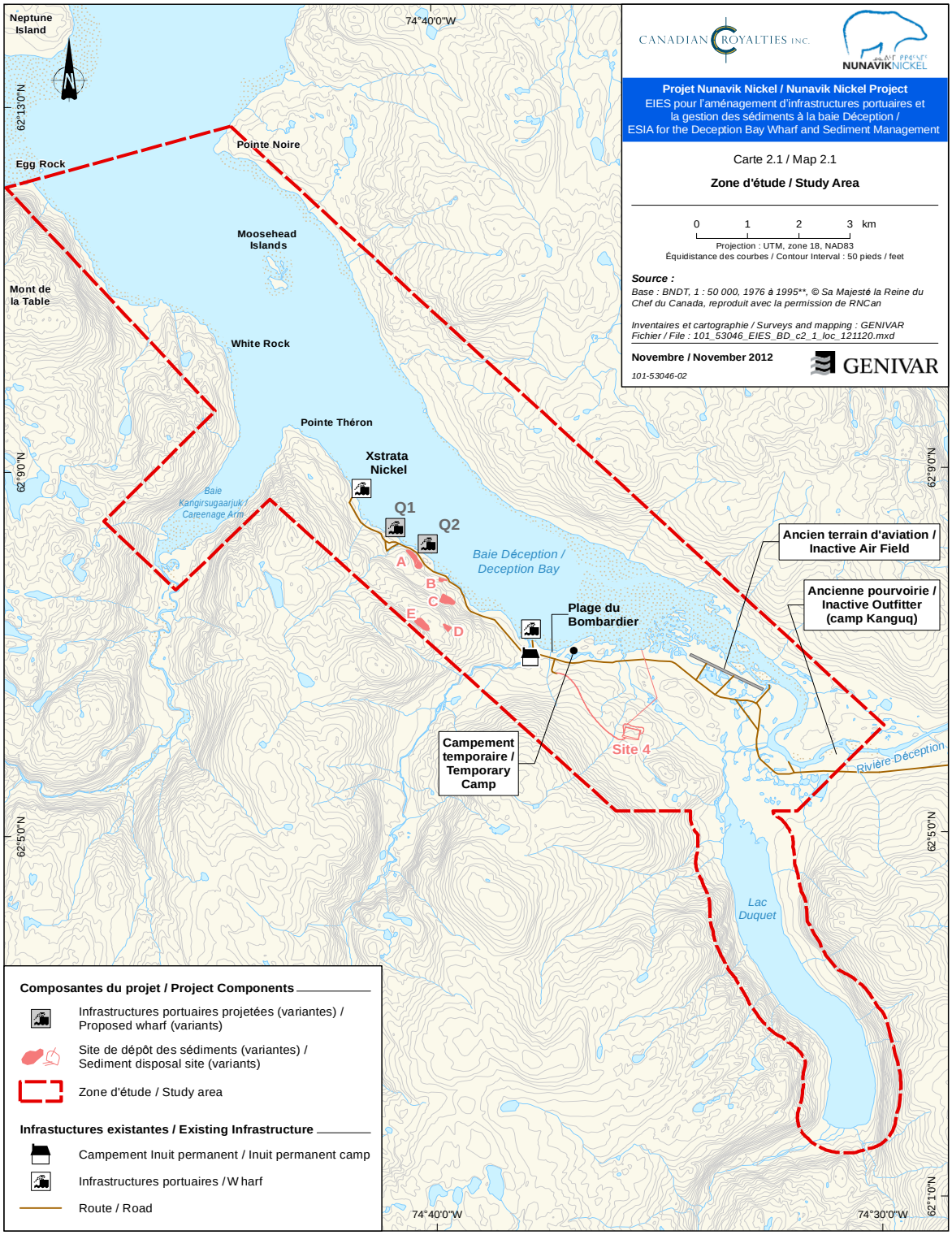
APPENDIX 1
PROJECT STUDY AREA
(taken from Génivar 2012)



APPENDIX 2

WHARF SITE PLAN
(taken from Génivar 2012)