



Alternatives Assessments

Technical Meetings, May 2012

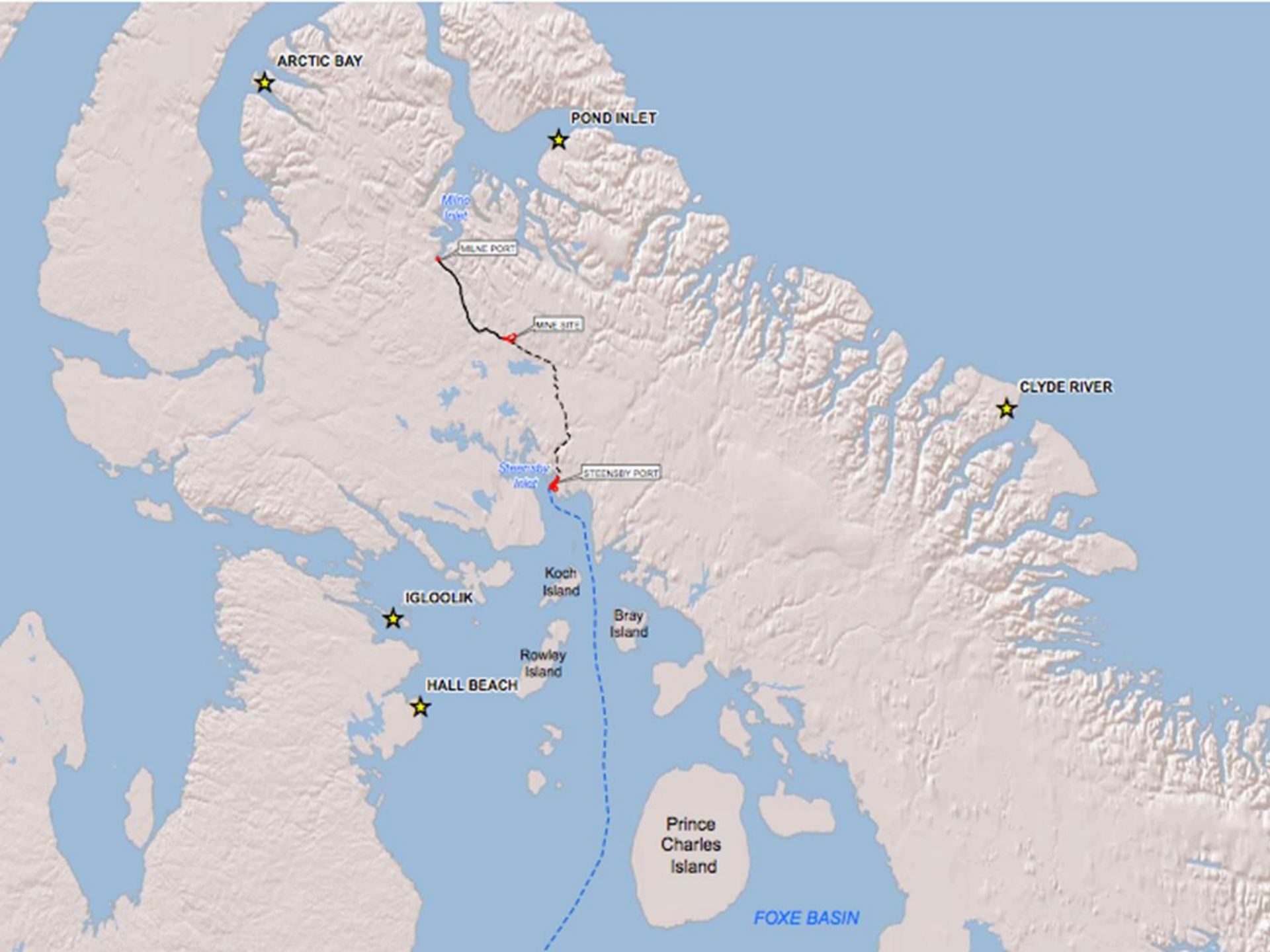
Presented by Oliver Curran

Agenda

- Project Areas
- Guiding Principles
- Evaluation Criteria
- Project Requirements
- Alternatives Assessed
- No go alternatives
- Conclusions



Project Areas



ARCTIC BAY

POND INLET

Milne Inlet

MILNE PORT

MINE SITE

Steensby Inlet

STEENSEY PORT

CLYDE RIVER

IGLOOLIK

Koch Island

Bray Island

Rowley Island

HALL BEACH

Prince Charles Island

FOXE BASIN

A large, white iceberg with a jagged, irregular shape floats in the center of a calm, blue ocean. The iceberg's surface is textured with shadows and highlights, suggesting its massive scale. To the right, another large, more rectangular iceberg is partially visible. The water is still, reflecting the sky and the ice. In the background, a low, dark landmass is visible under a clear blue sky with a few wispy clouds. A dark, semi-transparent banner is positioned at the bottom of the image, containing the text "Guiding Principles" in a white, sans-serif font.

Guiding Principles

NIRB Guidelines Section 6.1

- “The EIS shall include an explicit analysis of all alternative means of carrying out the Project components including a “no-go” alternative, the identification and application of criteria used to determine the technical feasibility and economic viability of the alternatives to the Project (e.g. transportation, natural, social, economic and cultural environment)”

Alternatives Assessment

Baffinland's approach for the alternative assessment complies with the CEAA Operating Policy for Addressing "Need for", "Purpose of", "Alternatives to" and "Alternative Means" under the *Canadian Environmental Assessment Act* (Original: October 1998; Update: November 2007) (<http://www.ceaa-acee.gc.ca>)

CEAA Operating Policy recommends the following approach for addressing "alternatives to" a project:

- *"alternatives to" a project should be established in **relation to the project need and purpose and from the perspective of the proponent**; and*
- *analysis of "alternatives to" a project should **serve to validate that the preferred alternative is a reasonable approach to meeting need and purpose and is consistent with the aims of the Act.***
- "Alternative means" are **the various technically and economically feasible ways the project can be implemented or carried out.** This could include, for example, alternative locations, routes and methods of development, implementation and mitigation.

Alternatives Assessment

CEAA recommends the following procedural steps for addressing alternative means:

1. Identify the alternative means to carry out the project.
 - develop criteria to determine the technical and economic feasibility of the alternative means;
 - describe each alternative means in sufficient detail; and
 - identify those alternative means that are **technically** and **economically feasible**.
2. Identify the environmental effects of each alternative means.
 - identify those elements of each alternative means that could produce environmental effects.
3. Identify the preferred means.
 - identify the preferred means based on the **relative consideration of environmental effects, and of technical and economic feasibility**;
 - determine and apply criteria that identify alternative means as unacceptable on the basis of significant adverse environmental effects; and
 - determine criteria to examine the environmental effects of each remaining alternative means to identify a preferred alternative.

Evaluation Criteria

- **Technical feasibility** relates to the appropriateness of an alternative from an engineering or operational perspective and incorporates aspects of known performance and reliability for the Project.
- **Environmentally acceptable** considers the expected severity of residual effects on the environment of one alternative relative to the other.
- **Social acceptability** considers community acceptability or preferences in the decision making process.
- **Economic viability** relates to the ability of the Project to achieve sufficient revenue to pay back the capital invested, pay the ongoing operating expenses, and cover the closure and reclamation costs while generating the necessary return on investment to attract the upfront capital investment needed. An option that results in negative cash flows is not an alternative.

Mary River Project Context

- Deposit No. 1 is located in central North Baffin Island
- Need a coastal port to get the ore to the consumers
- Need for efficient transportation from the mine to the coastal port
- Need for year round shipping of ore

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Alternatives Considered

Shipping of Ore

Overriding consideration:

- reliable and consistent delivery of iron ore to customers
- reliability and security of revenue stream for Baffinland

Two possible scenarios for shipping of ore:

1) Seasonal shipping

- Implies that ore is produced year round but shipped only during certain period of the year

2) Year round shipping

- Economically feasible for a minimum ore shipment tonnage of 18 MTPA

Seasonal Shipping of Ore

- Much higher capital and operating costs
 - Larger handling facilities at port site
 - Additional trans-shipment facility
 - More ore carriers
 - More manpower required for operation & maintenance
 - Expected increase in capital cost of 50% to 60% for the 18 MTPA ore produced
- Conclusion
 - Seasonal shipping is not economically viable and therefore not considered a project alternative

Port Location Assessment

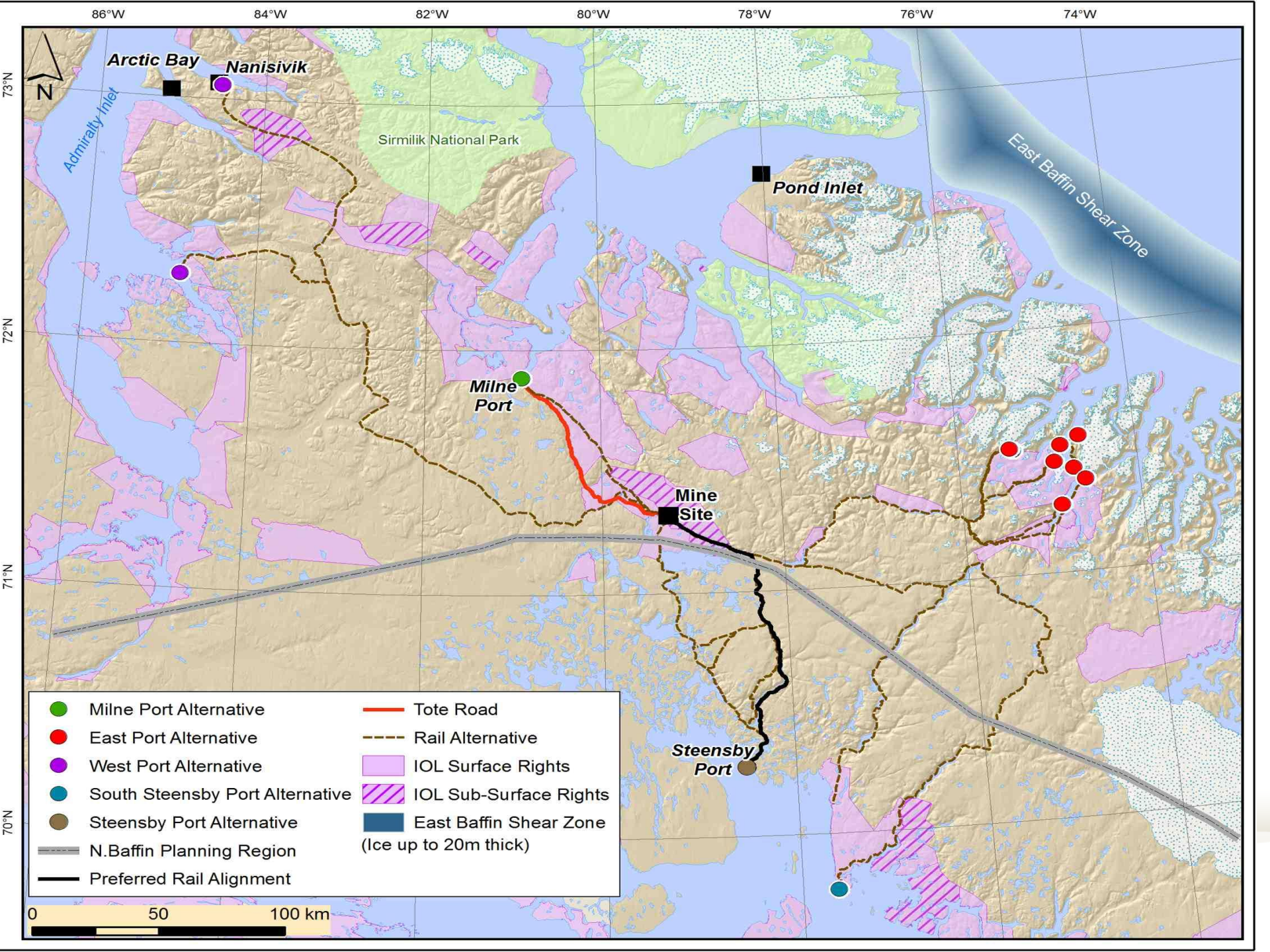
Choosing a location for a port was based on two fundamental factors:

- Shipping route and accessible to cape sized vessels year round
- minimal rail distance from mine (reducing train transport, potential environmental impacts, technical challenges and cost)

Locations Assessed

Locations considered in the assessment were grouped as follows:

- East Coast Locations
- Milne
- West Coast – including Nanisivik
- Steensby
- Nuvuit
- Iqaluit



East and North Coast Ice Conditions

- Significant ice formations on the north and north eastern seaboard of Baffin Island effectively form barriers to safe transit during up to two months of the year.

Quotes from Enfotec Report

- *The heavy ridging that can be expected at the entrance to and within Lancaster Sound has the potential to add significant delays to winter transits. This ridging, which has been known to be 20 m in depth, may at times be virtually impenetrable for periods of time while the ice remains under pressure. This may be narrowly viewed as a commercial consideration, however consequent long delays in vessel access to the port would almost certainly lead to congestion with several ships potentially affected. The Project would need to consider this possibility in determining winter shipping schedules.*

East and North Coast Ice Conditions

- The port option to Steensby Inlet would require a vessel two ice classes lower (PC 4/5) compared to Milne Inlet (PC 2/3). This is owing to the much lower concentrations of old ice found along the route to Steensby Inlet than is the case for Milne Inlet. It should be noted that the MV Arctic attempted early winter voyages into the eastern Canadian Arctic in early December in both 1986 and 1989 and had to abandon the voyages because of the heavy old ice concentrations and pressure in Baffin Bay just north of the entrance to Pond Inlet (the Canadian Coast Guard vessel CCGS Louis St. Laurent was with the MV Arctic in 1986 and the CCGS Sir John A MacDonald in 1989 and they both were also unable to contend with the ice conditions). However, the same MV Arctic now trades all winter to Deception Bay on the south side of Hudson Strait independently without any icebreaker escort through essentially similar ice conditions as those that lead to Steensby Inlet. This is an operational example of the difference between the ice conditions to these two port options.*

East and North Coast Ice Conditions

- *Ice navigation along the Baffin Coast can present considerable challenges as the full weight of the Baffin pack can descend on the coast south of Pond Inlet. The resulting ridging and shear zones, the locations of which would be dynamic would make route selection to the port subject to constant changes.*
- *The potential effects of Climate Change were considered as well. The conclusion being that changes in ice conditions due to Climate Change will be relatively consistent in the areas in question. There is nothing to indicate that Climate Change will effectively alter the localized patterns of ice development, indicating to us that ice conditions will remain significantly more difficult along routes to North Baffin compared to Foxe Basin.*
- *The Steensby Inlet fast ice appears level with no shear ridge at the entrance and no inclusions of old ice. The shore fast ice of Eclipse Sound is subject to ridging during freeze-up and often contains old ice inclusions. For these reasons Steensby Inlet has much more favourable fast ice conditions for winter navigation than the ice leading to any site in North Baffin.*
- ***Given the significantly more difficult ice conditions at the North Baffin Sites at present and in the future our recommendation is to pursue shipping through the Foxe Basin.***

Port Accessibility

- the selection of a port location is the primary component for the technical feasibility of the Project
- ports require:
 - sufficient water depth for ship docking and transit to and from the port;
 - sufficient area to allow for stockpiling, loading facilities and the ability to build rail transport to allow transportation of ore from the mine site to the port facility.
 - port facility must be accessible year round. The selected port must accommodate cape size ore carriers (160,000 to 190,000 DWT; approximately 330 m long by 50 m wide with 20 m depth) with ice breaking capabilities.
- The Ice studies (Enfotec) document difficult ice conditions on the north and east coast of Baffin Island – these port locations are not viable alternatives for the Project.

Port Alternative Location

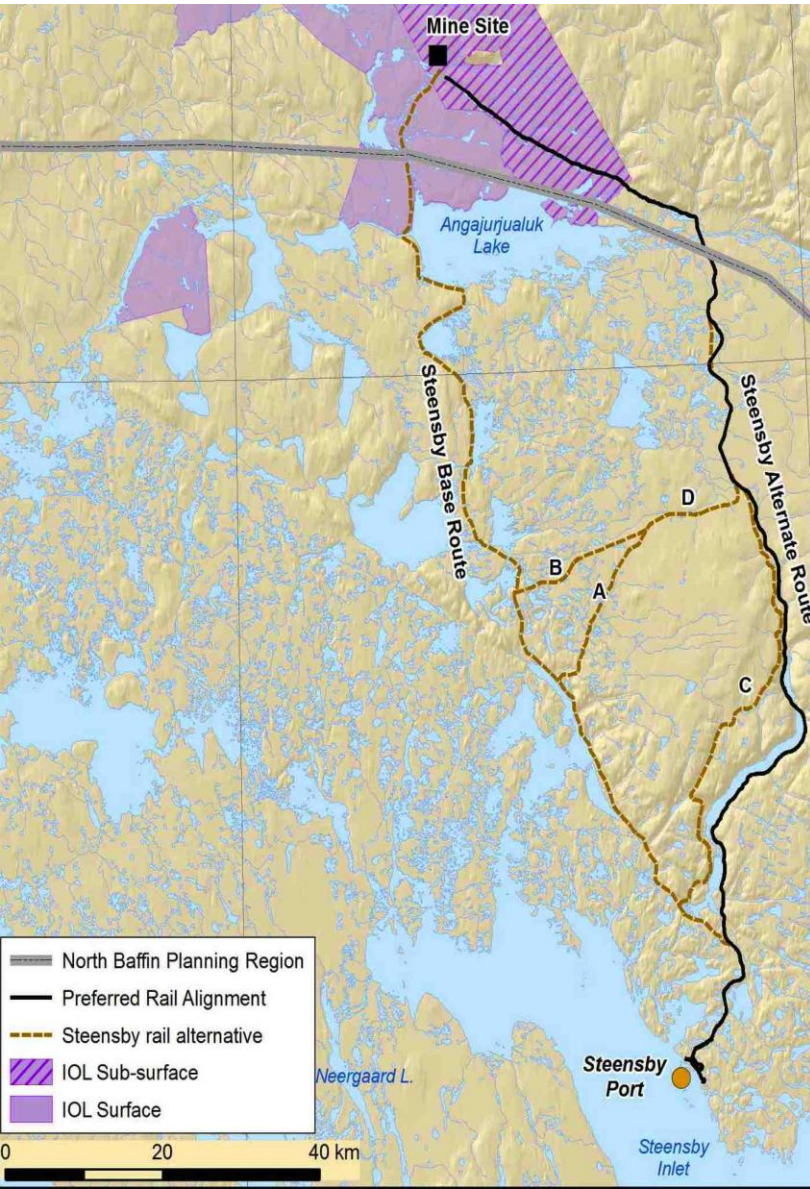
- Only two technically and economically viable alternative locations for uninterrupted year round shipping operation: Steensby and Nuviut
- East and North Baffin Island locations do not meet the criteria of “technical feasibility” with respect to:
 - Uninterrupted year round access to the port,
 - Navigability in the narrow fjord by the large ore carriers, and
 - Environmental and safety concerns related to access to the port sites through the dense ice pack and ice ridging at certain times of the year.

Technical Advantage – Steensby Port



Deep water, suitable grades and space for infrastructure

Technical Advantage – Steensby Port

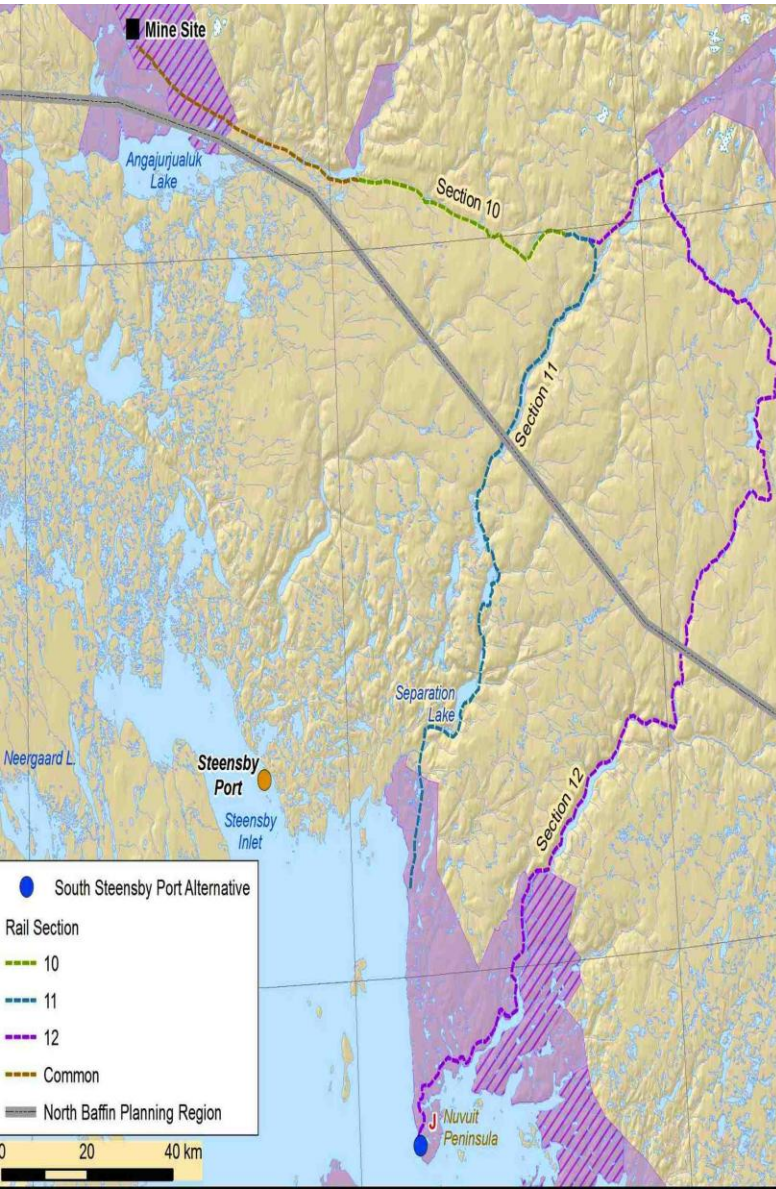


- Distance from Deposit No 1 to Steensby is 150km, less than half the distance to Nuvuit
- Several alternate rail routes to Steensby considered

Advantage – Steensby Port

- Reduced environmental footprint of rail (i.e. fewer stream crossings, quarries and less potential effect on caribou movement)
- Reduced marine footprint with dock structures
- Operable railway (decreased risk)
- Cost effectiveness

Technical Disadvantage – Nuvuit



Construction challenges:

- unstable ground
- Additional facilities and airstrip mid rail
- stream crossings
- rock cuts, bridges, tunnels
- 2 more years to construct – safety, cost
- Shallow water (government depth readings)

Rail Operations

Rail operations to Steensby are preferred:

- Trains travelling to Nuvuit cover twice the distance – requiring 7 trains instead of 3
- 3 train meets/day with Steensby compared to 29 train meets/day along the route to Nuvuit – more footprint
- More trains, rail spurs, signaling and operational safety concerns with Nuvuit

Rail Operations

From an environmental standpoint:

- Risk of accidental release or collision increases on rail route to Nuvuit
- Fuel consumption of trains increases by 14-15 million liters per year – carbon footprint
- Steensby route has lower impact and is more safe.

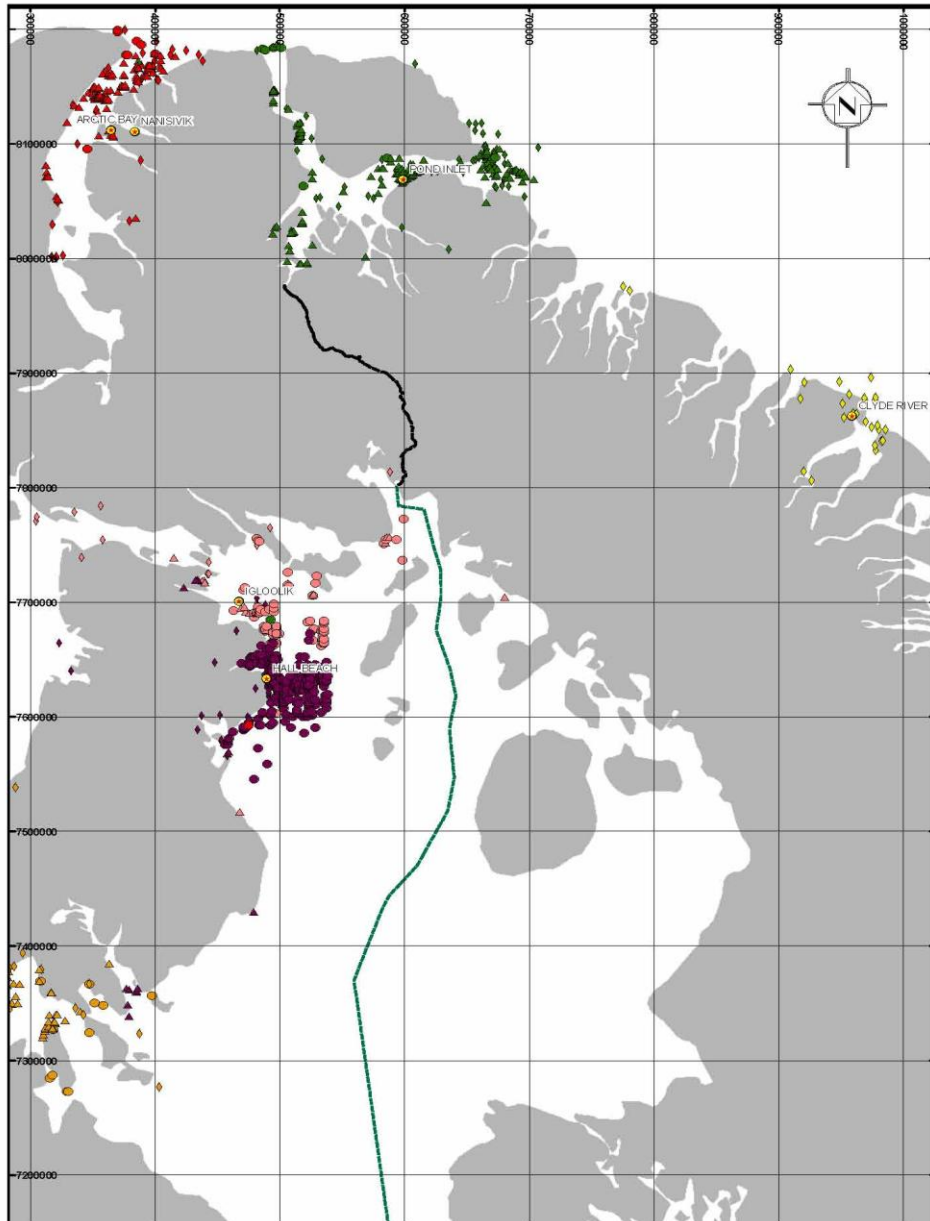
Economic Viability – Steensby vs Nuvuit

- A railway of 325 km to Nuvuit will increase building costs by \$1 billion (confirmed by QIA independent review)
- 2 years more to construct greatly reduces the attractiveness of the Project being developed
- Operating and maintenance costs are more than double (i.e. 7 trains instead of 3)
- Economic factors of a rail link to Nuvuit make the alternative unviable.

Economic Conclusions

- Project capital and operating costs cannot support a rail route to Nuvuit
- A larger dock structure would be needed at Nuviut to reach deep water further increasing cost
- These realities must be understood in the overall assessment of environmental and socio-economic effects

Shipping and Inuit Marine Harvesting



Reported Harvest Locations

From:

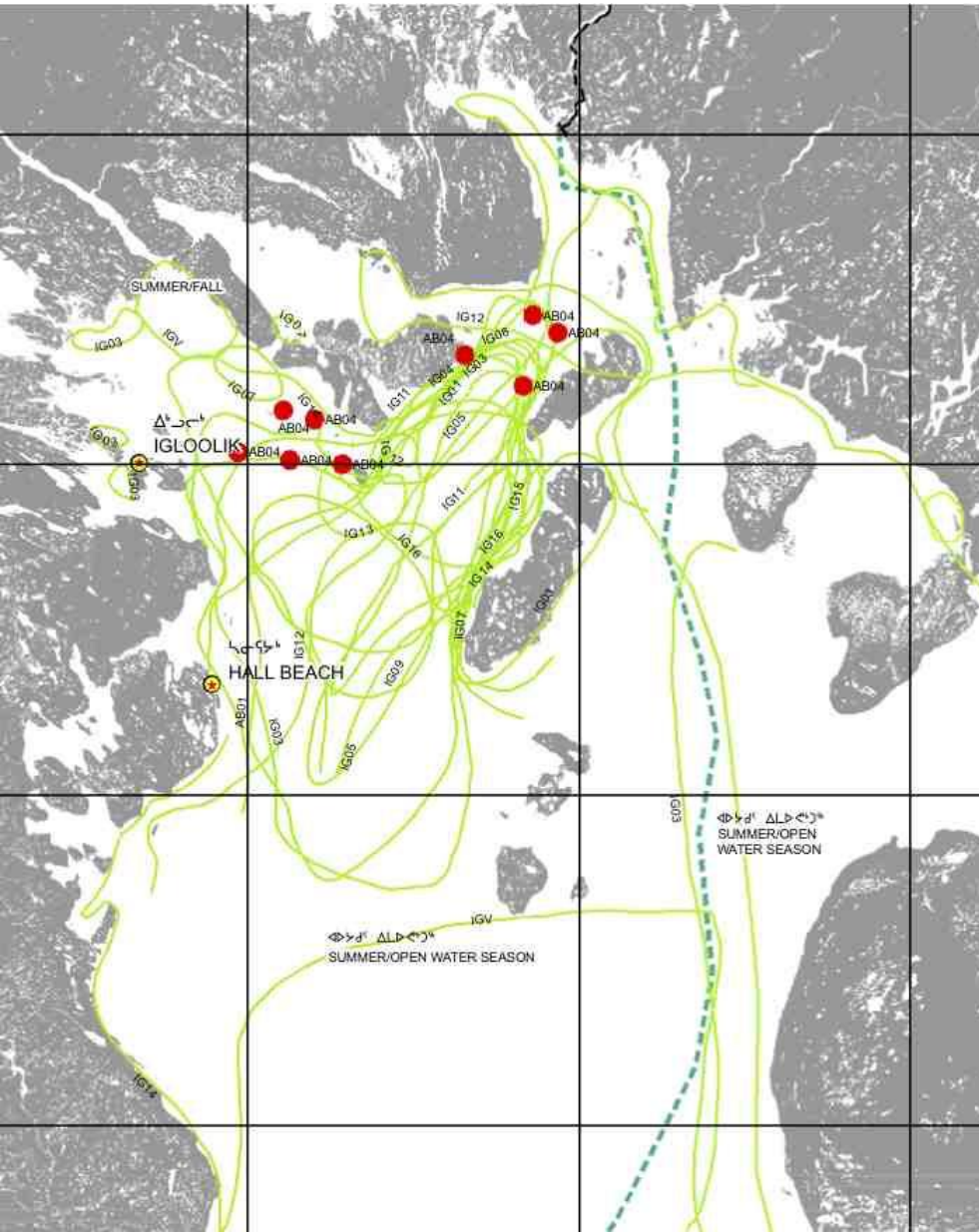
Nunavut Wildlife Harvest Study

(1996-2001)

LEGEND:

	Existing Tote Road		Arctic Bay Harvest Location
	Proposed Transportation		Clyde River Harvest Location
	Alignment		Hall Beach Harvest Location
	Nominal Shipping Route		Igloodik Harvest Location
	Community		Pond Inlet Harvest Location
	Whale		Repulse Bay
	Polar Bear		
	Walrus		

Inuit Knowledge - Walrus



- Based on the IQ study, the eastern route avoids a number of important walrus calving areas, and other areas where walrus were identified to be found and harvested.

Conclusions

- Based on evaluation of technical, economic and environmental criteria, Steensby Port is an essential feature of the proposed Project
- FEIS predicts no significant residual effects for the Project related to the shipping of ore from Steensby
- Baffinland is committed to ongoing discussions to work together to develop appropriate mitigation and monitoring to ensure Inuit livelihood and wildlife is preserved.