

## SECTION 9.0 - CUMULATIVE EFFECTS

The Nunavut Impact Review Board (NIRB) defines a cumulative effect as:

*“...the impact on the environment that results from the incremental effects of a development when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.”* (NIRB, 2009)

The cumulative effects assessment (CEA) in Volume 9, Section 1 identifies the residual effects of the Project, and the potential to interact with the residual effects of other projects or activities that could result in a greater effect to a valued component (VC) of the biophysical or socio-economic environments. The CEA consists of three main steps:

- determine whether the Project will have a residual effect on identified valued components (VECs and VSECs, together referred to as VCs);
- if a residual effect is likely, assess the potential for the Project’s residual effect to interact with residual effects resulting from other projects or activities (past, current, or future); and
- determine if the interaction of the residual Project effect, in combination with other project effects, is likely to meaningfully influence a VC.

The assessment of a single project determines if *that* project is incrementally responsible for adversely affecting a VC beyond an acceptable level. The CEA must make clear to what degree the project under review is *alone* contributing to that total effect. Interactions are only considered if their assessment would influence the decision regarding approval by the regulatory reviewers.

The temporal boundaries selected for the cumulative effects assessment was 1970 to 2045, a time period of 75 years, based on the approximate date of introduction of industrial development in the area and the life of the current Project. The Nunavut Settlement Area was selected as the spatial boundary for the assessment, with provisions to include shipping through Hudson Strait associated with the Raglan Mine. Study areas were selected appropriate to the evaluation of each VC.

The CEA considered certain and reasonably foreseeable past, present, and future projects. These are defined as follows:

- Certain: based on currently available information at the time of writing the project or activity exists, will proceed, or there is a high probability the action will proceed; and
- Reasonably foreseeable: based on currently available information at the time of writing, the action may proceed, but there is some uncertainty about this conclusion.

For the assessment, 'certain' projects includes past and ongoing projects and activities as evidenced by existing disturbance areas and facilities, current land use tenures and activities, and traditional knowledge and use. 'Reasonably foreseeable' projects are those projects and activities that have entered into a formal project approval or permitting process, projects that have not entered a formal process but that have been discussed publicly by proponents, and those specified in the Guidelines (NIRB 2009).

Several key certain and reasonably foreseeable projects and activities were identified and considered in the assessment:

- Baffinland's previous exploration and bulk sampling programs;
- Baffinland's proposed monitoring programs concurrent with the Project;
- Raglan Mine at Deception Bay, Nunavik
- Meadowbank Mine near Baker Lake, Nunavut
- The decommissioned Nanisivik and Polaris Mines;
- A potential mine associated with the Roche Point Iron Ore Project, south of Hall Beach;
- The induced expansion of the Mary River Project through development of additional iron ore deposits; with a credible development scenario of a doubling of the proposed production rate;
- General shipping through the study area, based on shipping statistics for a 9-year period from 2002 through 2010;
- The proposed naval facility at Nanisivik;
- DEW Line Decommissioning;
- Air Transport;
- Military Exercises;
- Traditional land use;
- Communities; and
- Climate Change.

The assessment concludes that the greatest potential for cumulative effects on terrestrial and socio-economic VCs was the potential for induced development of additional ore bodies at Mary River. Under this scenario, Baffinland assumes that development of additional deposits would practically involve an approximate doubling of production output over the temporal scale of the assessment, through the development of one or two additional deposits. It is unlikely that more than this would be developed before the end of life of the current Project (and temporal boundary of the cumulative effects assessment), based

on capital requirements, the required ship fleet, throughput capacity of the port sites, and the market for iron ore within the temporal bounds of the assessment.

The potential for cumulative effects on marine VCs is driven by current shipping by mining projects, community sealifts, military and coast guard traffic, all represented by the shipping statistics available, as well as previous and reasonably foreseeable mining projects. Again, the credible expansion scenario for Mary River was the largest factor in the assessment.

No significant cumulative effects were identified in the assessment. The assessment identified the potential need to incorporate additional mitigation measures to maintain effects below acceptable thresholds. The following summarizes the conclusions for each VC:

- Climate change – a cumulative effect on climate change will occur through the release of greenhouse gases (GHG), though these emissions will not be significant in the context of global GHG emissions;
- Air quality – a cumulative effect to air quality will occur within the Project's local study area as a result of Baffinland's credible expansion scenario. It is expected that the cumulative effect will not be significant, with the application of additional mitigation measures, if necessary;
- Noise – a cumulative effect will occur in the vicinity of the Project due to the expansion scenario, but this effect will not be significant;
- Vegetation – cumulative effects are likely to occur to vegetation within the terrestrial RSA as a result of the expansion scenario and possibly additional exploration, but this effect will not be significant;
- Caribou – an incremental amount of habitat will be lost within the North Baffin caribou range due to the expansion scenario and ongoing exploration and aircraft disturbance, but cumulative effects to caribou movement and mortality are not expected. The predicted cumulative effect to caribou is not significant.
- Migratory birds – an incremental amount of habitat loss within the terrestrial RSA is predicted to be not significant;
- Freshwater quantity and quality – incremental increases in water withdrawals from water supply lakes, and additional runoff into the Mary River from new mining areas within the freshwater LSAs will not be significant;
- Freshwater fish – potential additional effects to fish and fish habitat, from habitat loss or water quality changes, are predicted to be not significant;
- Sea ice – additional disruption of fast ice is likely to occur within Steensby Inlet; based on an assumed doubling of ice breaking associated with the credible expansion scenario for the Project and a conservative estimate for how much fast ice will be disturbed with each ship passage, the cumulative disruption effect approaches the selected threshold of disturbance based on ringed seal habitat. It is

expected that based on the conservatism in the estimate, and with additional efforts to restrict the amount of fast ice disturbed, that this effect will be not significant.

- Marine water and sediment quality – increased production will result in ballast water discharges at the port sites twice as frequently, and increased dust emissions. Increased frequency of ballast water discharge could result in water quality changes that may in turn affect the composition of local benthic biota. Increased dust could similarly increase the magnitude of water quality effects. Additional modelling of ballast water dispersion and ore dust deposition would need to be undertaken to confirm whether effects are significant, but it is expected that with additional mitigation (for example, ballast water treatment; or additional dust emission controls) that these effects could be satisfactorily mitigated to within acceptable limits, with no significant cumulative effect. Monitoring as part of the Project will allow for more accurate predictions in a future environmental assessment, if a project expansion occurred.
- Marine biota - under the credible scenario of a doubling of production at Mary River, no changes to infrastructure at Steensby Port will be required, and no cumulative effects to marine coastal habitat are expected.
- Marine mammals VECs - for purposes of this assessment, the credible development scenario of a doubling of production at Mary River is assumed to result in an approximate doubling in shipping frequency. This increase in shipping frequency would likely increase the potential for synergistic cumulative effects because the frequency of ore carrier transits will be approximately doubled along the shipping routes, thereby increasing the likelihood that more than one ore carrier may transit a given area at the same time. Synergistic disturbance and masking effects from icebreaking ore carriers are most likely to act on belugas, narwhals, and bowhead whales in Hudson Strait during the ice-covered season. During the open-water period, cetaceans, particularly narwhals in Eclipse Sound and Milne Inlet, may also experience synergistic disturbance and masking effects. These cumulative effects, especially masking, could extend beyond the LSA. Should a decision be made to seek approval to proceed with the development of additional Mary River ore deposits, an environmental assessment would likely be required and, no doubt it would include a detailed cumulative effects assessment. The certainty level in cumulative effects predictions at that time will be increased by the results of the marine mammal monitoring program proposed for shipping activities associated with the current Project; this monitoring program is expected to address the uncertainties in marine mammal response to ore carrier traffic in Hudson Strait, Milne Inlet, and Eclipse Sound.

With respect to Communities, the following Valued Components and Key Indicators were considered in the cumulative effects assessment:

- Population demographics (demographic stability) – the Roche Bay Project and Nanisivik Naval facility, if the either proceeds, will have overlapping employment and the possibility to induce in- or out-migration. The cumulative effect, however, is predicted to be not significant.
- Human health and well-being (substance abuse; and community and social stability) – cumulative effects are possible with the same two projects above, but are not predicted to be significant.
- Community infrastructure and public service (competition for skilled workers) - given that the Project demand for labour may exceed supply, any additional projects are unlikely to have a cumulative effect on this VSEC.

For the purpose of this cumulative effects assessment only negative residual effects were addressed, though it should be noted that most of the residual socio-economic effects determined for the Project will be positive effects. In considering the cumulative effects that may arise through interactions with other projects and other reasonably foreseeable projects, none of the positive residual effects are expected to become adverse through any reasonably foreseeable interaction, and therefore, these positive residual effects are not considered further.

Additionally, an expansion scenario at Mary River combined with other land uses may have cumulative effects on cultural resources (archaeological sites). However, Baffinland has well established procedures for managing cultural resources and therefore an expansion of the Project is unlikely to cause cumulative effects since surveys will be conducted and any sites properly mitigated. The activities of other land users could contribute to a cumulative effect that can be managed through effective enforcement through land use permits.

Other current and reasonably foreseeable projects in the area, combined with the Project under an expansion scenario, is not expected to meaningful increase effects to land use to cause a significant effect. Roche Bay and the Nanisivik Naval Facility may affect land use around Hall Beach and Arctic Bay though the extent of these effects are not known, and are removed from the Mary River Project's zone of influence on land use.