Submission to Nunavut Impact Review Board

Mary River Project – Early Revenue Phase

Response to Technical Meetings November 26-28, 2013

Commitment # 20

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Assessment of the Environmental Effects of Dredging at Milne Port

Introduction

In planning the ore dock construction for the Milne Port associated with the Mary River Project, one design alternative involves the need to dredge at the dock face to provide a level seabed surface for construction. The preferred approach to disposition of the dredged material will be to deposit it within the approach causeway required for land access to the ore dock. The following description provides an assessment of the potential environmental impacts of the dredging operation on the marine environment at Milne Inlet.

Project Description

The area to be dredged is 1 ha. (Figure 1) and the volume of dredged material is estimated to be between 30,000 to 40,000 m^3. Water depths range between 3 and 20 m. Dredging will produce a nominal water depth of 21 m. A clamshell dredge, with a bucket measuring approximately 4 to 5 m^3 in size, will be operated from a floating barge. Dredging activities are planned for August, 2014 and duration will be roughly 15 to 20 days, based on a single 150 tonne marine derrick, and approximately 18 hours operation per day.

As illustrated in Figure 1, to facilitate loading the ore carrier vessels the ore dock will include a causeway leading to the dock face. This causeway and the sides of the dock leading to the dock face will be stabilized with coarse fill. The coarse fill will also be used to create a secure, contained repository for materials dredged from the dock face area within the actual dock structure.

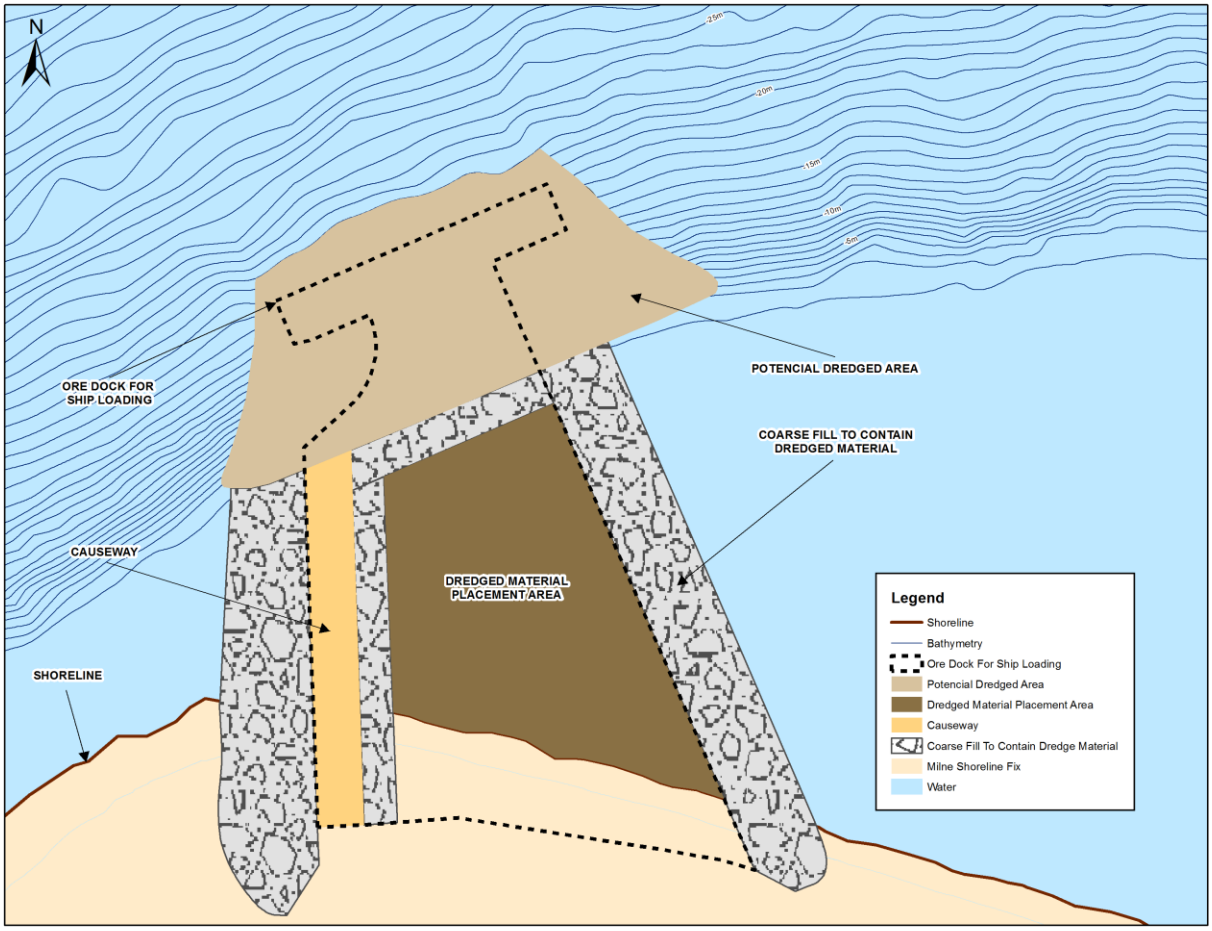

Figure 1 Area to be Dredged, Milne Ore Dock

The dredged material (dredgate) will be placed into either a flat scow or dump/split scow. Initial placement of dredgate into the shoreline filling area will employ dump scows that will be floated into the shallow waters of the infill area. Once the placement depth no longer allows for dump scows (depth getting too shallow), the contractor will use an excavator on a temporary dock to offload the scows and transfer the sediments from the scow to trucks and then continue filling the shoreline using trucks. Past work by CORI (2008) and recent work by SEM (in prep) have recorded gravelly sands in the shallower areas with silt and clay (particle size less than 62.5 µm) in deeper areas of the ore dock Footprint. The substrate in the deeper areas is composed of up to 38 % fines (silt and clay) (Table 1).

Table 1 Particle Size Analysis of Sediment Samples Collected at the Milne Inlet Ore Dock Footprint, 2013 (SEM, in prep)

Depth (m)	% Gravel	% Sand	% Silt	% Clay
4.1	6.3	92	0.61	1.5
6.4	6.3	85	3.7	5.0
9.8	31	35	19	15
10.1	17	59	13	11
10.4	49	40	5.7	4.9
16.4	58	33	4.7	4.5
20.1	29	44	17	11
20.5	8.3	54	24	14
20.8	28	43	26	3.5
23.3	56	33	6.2	4.7

Regulatory Context

Activities that result in permanent alteration or destruction of fish habitat are regulated by the Fisheries and Oceans Canada under Section 35 (1) of the Fisheries Act. Disposal of dredge spoils at sea is regulated by Environment Canada under Part 7, Division 3 of the Canadian Environmental Protection Act. Disposal on land would be regulated by the Government of Nunavut.

Potential Impacts and Mitigations

Serious Harm to fish, invertebrates and habitat may result from direct contact with dredging equipment and siltation. The impact of noise and its effect on fish and marine mammal behavior is also a consideration.

Catches in the 2013 experimental fishery in the Ore Dock Footprint area included three species of sculpin (total of seven) and one ocean pout indicating limited utilization of the area by finfish (SEM, in prep). Although the timing of the experimental fishery coincided with the period when Arctic char typically utilize the marine environment, no char were captured in the two gill net sets. Serious Harm to fish from direct contact with the clamshell is unlikely as it is anticipated that fish will avoid of a small area around the dock sites due to the underwater noise generated during dredging and construction (Mary River FEIS – Volume 8). In addition, it appears that Arctic char, a key indicator of marine aquatic habitat and biota in Milne Inlet, are uncommon in the immediate area.

Invertebrates captured in the Footprint area in 2013 included brittle stars, sea urchins, common whelk, molluscs and boreal shrimp (SEM, in prep). These results are similar to observations from an underwater video survey by CORI (2008) that reported brittle stars, sea urchins and bivalve siphons were commonly observed in Milne Inlet. Both the benthic and epibenthic fauna present in the area are comprised of individuals adapted to a depositional environment. Dredging will result in loss of local epibenthic and benthic biota within the 1 ha surface area to be excavated. However, there is no evidence of any unique or rare species occurring in the area, nor would the temporary loss of this biomass represent a measurable portion of the food/prey sources for Arctic char or Arctic cod.

Observations made with underwater video imagery in 2008 formed the basis of the nearshore seabed habitat mapping at the Milne Inlet Port Site (Mary River FEIS – Vol. 8). Substrates are gravelly sands that become finer with depth. These observations were corroborated in an underwater video program in 2013 in the Footprint area that recorded gravelly sands in the shallower areas with greater amounts of silt and clay in deeper areas (SEM, in prep). On the basis of this information it may be assumed that dredging will result in some suspension of small grain sized material and the subsequent settlement of this material (siltation). Work conducted by CORI in 2008 and 2010 on the potential fate of ballast water discharges in Milne Inlet found that tidal currents are weak in Milne Inlet and even during times of maximum tidal flow, tidal currents will have little time to deflect gravity currents from their downslope course (Mary River DEIS – Volume 8. Appendix 8B-2). These results indicate that siltation caused by dredging would mimic natural phenomena (e. g. storms) and act to re-deposit fines into the deeper settlement areas of Milne Inlet and not compromise benthic organisms found at shallower sites.

Impacts on finfish could include impairment of sight due to turbidity and possible clogging of gills. However, given the limited geographic area associated with the dredging activity, combined with the short duration of the work, siltation is predicted to have a minimal (not significant) environmental effect on pelagic species such as Arctic char or Arctic cod.

Any human-made (anthropogenic) noise that is strong enough to be heard has the potential to reduce (mask) the ability of marine mammals to hear natural sounds at similar frequencies, including calls from other animals, echolocation sounds, and environmental sounds such as surf noise or ice noise. Dredging will produce a repetitive sequence of sounds generated by winches and derrick movement, bucket impacts with the substrate, digging into substrate, bucket closing and the emptying of material into a hopper barge or scow. In the case of Milne

Inlet Ore Dock construction, these sounds would only occur for a relatively short period (15 – 20 days) in August, 2014. Responses of fish to short-term, high energy noises can include sustained or temporary startle and alarm responses (Mary River FEIS – Volume 8). Impacts would be limited to potential short term avoidance as of the area where the noise is generated.

Marine mammals that may frequent the area in August include ringed seal (a resident species in the area), and migrating narwhal, beluga whale and bowhead whale (Mary River FEIS – Volume 8). The small spatial extent, limited duration and overall small magnitude of interactions between the Project and these marine mammal species lead to a conclusion that the residual environmental effects are predicted to be low and not significant. Since narwhals and beluga whales travel in pods numbering up to 100's of animals, it is recommended that, as mitigation for the noise generated during the dredging operations, dredging cease in the event that large concentrations of marine mammals are observed present within 500m of the construction site.

Summary

The dredging required for the construction of the ore dock at Milne Inlet will have a limited effect on biota and habitat in the immediate area of the activity. On the basis of the timing and limited duration of the activity and the weak tidal currents in the area, it is unlikely that any siltation would have a detectable effect or any substantial impact on pelagic species. The noise generated by dredging activities will have minimal effect on fish or marine mammal species. As a precaution, monitoring should be carried out to detect the presence of marine mammals. It is recommended that operations cease if large concentrations of marine mammals occur within 500m of the construction site.

References

Coastal Ocean Resources Inc. (CORI). 2008. Summary of 2008 Coastal and Ocean Resources Inc marine activities associated with the Baffinland Mary River Project. CORI Project: 08-23. 45 p.

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Sikumiut Environmental Management Ltd. (SEM). In prep. Results of 2013 marine baseline survey, Milne Inlet.