

Chatham Rise Rock Phosphate Project – Assessment of Potential Environmental Impacts

The potential impacts on the marine environment of CRP's mining proposal, as assessed within the EIA, are:

- The immediate impacts of seabed disturbance from drag-head operations.
- Physical impacts of returning the non-phosphatic material to the seabed.
- The impacts on ecological and conservation values.
- The impacts of sediment disposal on water and sediment quality.
- Impacts associated with vessel and mining related noise, including on marine mammals.
- Vessel lighting impacts on seabirds.
- Vessel waste discharges, biosecurity issues and project operational management and risks.
- Cumulative impacts - mining impacts in addition to similar impacts already occurring on the Chatham Rise, namely the impacts associated with bottom trawling for fish.

Immediate impacts of seabed disturbance from drag-head operations

The immediate impact of mining is removal of the seabed, including benthic fauna in and on the seabed (discussed below). CRP has proposed an environmental compensation package given that this impact cannot be avoided, remedied or mitigated. This mining operation is likely to result in a small near-bed plume of sediment associated with drag-head operations. However, the plume will be small compared with that generated by return of non-phosphate sediments to the seabed following separation on-board the dredging vessel.

Physical impacts of returning the non-phosphatic material to the seabed

The return of sediments to the seabed will form a near-seabed plume of suspended sediment with subsequent transport of suspended sediment away from where it was discharged. As the sediment is transported away some of the sediment settles, with the greatest amount settling close to where it was discharged.

The transport of suspended particles and sedimentation have been modelled with techniques used worldwide for similar projects.

The proposed mining system minimises the possibility that the suspended sediment will affect the biologically productive surface waters. This is achieved by returning the material, via a pipe, that discharges approximately 10 m above the seabed and within the area that is being mined. This ensures that there is no impact within the euphotic zone and that adverse impacts on the organisms that live in this zone, including a number of the key fisheries resources, are effectively avoided. The most significant impacts of the suspended sediment plume are predicted to be in the bottom 10 m of the water column and within less than a kilometre of the mining blocks.

The suspended solids concentration in the plume is predicted to be near background levels within about 15 km of the mining blocks.

The plume is predicted to rapidly dissipate and the levels of suspended sediment are predicted to return to ambient levels within about two days of mining operations stopping.

The majority of sediment is predicted to be deposited within about 500 m of the mining blocks, with some minor impacts extending to a distance of about 7 km.

Physical impacts and impacts on ecological and conservation values

Given the proposed implementation of avoidance, remediation and mitigation measures, potential impacts on other conservation values, including marine mammals and seabirds, will be minor.

The removal of the seabed and the return of the non-phosphatic sediment to the seabed results in impacts on benthic fauna (loss of fauna and habitat within the mining area and potential sedimentation impacts adjacent to), and potential impacts on other Chatham Rise ecological values, including values of conservation significance. The benthic habitats, and thus fauna, most significantly affected by mining operations, are the areas of phosphorite nodule exposed at the seabed. This loss cannot be avoided.

The ability of marine communities to recover over time is of key importance in the environmental management strategy for this project. Organisms that live in soft sediments are generally resistant to intermittent increases in suspended sediment concentrations and deposition, whereas animals that attach to hard surfaces are often less tolerant of these changes.

The communities immediately adjacent to the mining blocks will be impacted by sedimentation, but the impacts are predicted to decline rapidly away from the mining blocks as the plume disperses and sedimentation decreases.

Restricting mining operations during the first five years such that sedimentation impacts from mining blocks do not overlap on an annual basis, and the establishment of the mining exclusion areas, will encourage recovery of communities by lateral movement of mobile adults and recolonisation by larvae.

Recolonisation of the mined areas, and areas covered by sediment will commence within a relatively short period and recovery to a diverse soft-sediment benthic community is likely within several years.

Recolonisation and recovery of animals that depend on hard outcrops will be much slower, and will not occur if all the hard material, for example the phosphorite, is removed. These animals include cold water coral species.

Efforts to protect these species include the identification of mining exclusion areas to protect their habitat, design of the mining system to minimise the area affected by significant

sedimentation, and experiments to test the feasibility of replacing hard substrate at the seabed, and thus create habitat.

Scientific study of the food web on the Chatham Rise indicates that it is unlikely that the loss of benthic fauna in the mining blocks will have a significant impact on the Chatham Rise ecosystem.

This ecosystem is largely driven by phytoplankton growth and although the benthic ecosystem does play an important role for some components of the system, the mining block loss is considered to be minor in the context of the marine consent area and the Chatham Rise environment as a whole.

In addition, although the marine consent area overlaps with a fishing benthic protection area, CRP has undertaken a marine spatial planning exercise that it considers better recognises the values associated with the central crest of the Chatham Rise.

If the areas (including the area beyond the marine consent area) identified from this exercise (or any other similar exercise) are protected from seabed disturbance through an appropriate legal mechanism, as proposed by CRP through a condition of its marine consent, then more environmental suitable areas will be protected in the future.

Irrespective of broader national issues associated with the establishment of marine protection areas, CRP has set aside mining exclusion areas which were identified through a process designed to balance environmental and economic values.

Impacts of sediment disposal on water and sediment quality

The risk of adverse impacts on water and sediment quality from the returns has been assessed as very low.

In common with many other mineral sands, the phosphorite and associated sediment has a natural geochemistry that results in the release of some constituents into seawater when the sediment is mixed during the mining and separation process. In addition, biota will also become entrained with the returns.

There is no indication that the addition of small amounts of either inorganic or organic material from the phosphorite, sediments or entrained organisms will result in a significant degradation of water or sediment quality. Impacts associated with vessel and mining related noise.

Studies have shown that the zone within which some response might occur, however small, to noise from the mining operations is restricted to less than 2 km from the vessel in the case of several whale species, and to the immediate vicinity of the vessel in the case of other marine mammals.

The best information on behavioural responses to sound is available for marine mammals, particularly whales and dolphins. The sound levels generated by an operating dredger similar

to the equipment that will be used on the mining vessel are comparable to those of a similar-sized ship in transit across the Chatham Rise area and well below those known to cause injury to marine mammals.

They are much less than the potentially damaging sound levels of activities such as pile driving during engineering works or seismic surveys with large energy sources.

To avoid impacts on marine mammals, visual search will be made for marine mammals near the vessel before the start of mining operations, and mining will not start until all marine mammals are clear of the area.

Vessel lighting impacts on seabirds

Lighting on vessels at sea can cause disturbance to seabirds at night. CRP has identified lighting policies and procedures for the vessel that will minimise these impacts, in line with international best practice.

Vessel waste discharges, biosecurity issues and project operational management and risks.

All commercial vessels at sea are required to comply with regulations governing control of waste discharges, including discharge of ballast water and related biosecurity issues. CRP has developed policies and procedures for its vessel operations that will ensure compliance with regulations relating to the operational safety of the vessel and with protection of the environment.

Cumulative impacts

Currently, the only human use of resources on the Chatham Rise is commercial fishing, including long-lining and trawling. Bottom trawling by fishing vessels has a significant impact on the Chatham Rise environment. Studies have shown that bottom trawling affects organisms living on the seabed, generates a plume of suspended sediment, and that repeated trawling can change the characteristics of the sediments at the seabed.

During the 1989/90 to 2010/11 fishing years, the area of the Chatham Rise seabed above the 1,000 m contour, swept by trawling is estimated to be 92,346 km².

Research shows that the seabed environments and communities on the Rise flanks are generally different from those on the crest, and the impacts of fishing and mining are unlikely to have significant cumulative impacts on these environments and communities.

Mining will result in cumulative impacts on seabed resources on the crest of the Chatham Rise but this loss is proportionally very small when compared with the area on the flanks that has been and continues to be affected by commercial fishing.

Summary - Potential impacts and assessment of environmental risk

An environmental risk matrix approach was used to assist in assessing the significance of these impacts and environmental risks.

The level of environmental risk is usually determined after the application of avoidance, remediation and mitigation measures. Mitigation is proposed for potential impacts with high or serious environmental risk, and in instances where it reflects responsible corporate environmental behaviour and industry best practice.

CRP's mining operations will be carried out in accordance with environmental management and operational procedures, including environmental monitoring, in accordance with the Environmental Management and Monitoring Plan (EMMP). The EMMP and its supporting management plans will form CRP's environmental management system for its mining operations.

If mining is conducted according to the environmental management system and industry best practice then the physical impacts from drag-head operations, impacts on water and sediment quality, impacts on commercial fisheries (including on the Chatham Rise and at the Chatham Islands), impacts on conservation values, noise impacts, vessel waste discharges, biosecurity issues and project operations risks outside the mining area are minor, and they are low to medium environmental risks.

Potential impacts on seabirds from vessel lighting prior to the application of mitigation approaches were assessed as a medium to high environment risk, but following the application of proposed avoidance, remediation and mitigation measures the potential environmental risk reduced to medium or low.

The potential impacts from the loss of seabed habitat and fauna within the mining blocks and sedimentation impacts on seabed habitat adjacent to the mining blocks remain a high or serious environmental risk even after the adoption of proposed mitigation measures.

For this reason, a programme to monitor the impacts, including the nature and timing of recolonisation of mined areas, is proposed prior to and during the initial stages of mining.