Introduction

Chatham Rock Phosphate Limited (CRP) proposes to mine phosphorite from the crest of the Chatham Rise. Phosphorite contains phosphorus one of the main components of commercial fertiliser, whose use has contributed to the growth in agricultural productivity in New Zealand and around the world.

The well-being of New Zealanders and the New Zealand economy depend on agriculture and fertiliser is an important requirement for our agriculture. Every year approximately one million tons of rock phosphate is imported into New Zealand for processing into fertiliser. Security of supply and price instability are risks to New Zealand’s agricultural sector and thus its economy.

On the seabed east of Banks Peninsula, about half way to the Chatham Islands, there is a deposit of rock phosphate sufficient to supply New Zealand’s present needs for at least 25 years. This phosphate has very low cadmium content and can be applied directly to the land as a slow-release fertiliser, thereby reducing the runoff issues associated with processed fertilisers.

Economic gains from the mining activity will result in New Zealand’s GDP being boosted by NZ$280 million per year. Domestic consumption will increase with a predicted welfare gain of NZ$130 million per year of mining, and implementing the project over a 15 year period will be equivalent to New Zealand becoming NZ$900 million richer today. There are also environmental gains which include lower cadmium input to soils, reduced emissions during shipping and reduced phosphate runoff.

CRP has a mining permit for an 820 km² area covering the known richest area of the phosphate deposit. CRP also holds a prospecting licence surrounding the mining permit and has applied for prospecting permits for adjacent areas, to the west and east of the prospecting licence, where phosphate has been previously discovered.

In addition to its mining permit, CRP requires a marine consent under the Exclusive Economic Zone and Continental Shelf Act (Environmental Effects) Act 2012 (EEZ Act) before mining can commence. CRP is now seeking that consent as outlined in its Marine Consent Application and Environmental Impact Assessment, hereafter referred to as ‘the EIA’. It describes the potential environmental, economic and social impacts of the project and how adverse impacts will be avoided, reduced or mitigated.

The application covers the full 10,192 km² of the permits and licences CRP holds, or has applied for, because this provides improved options for balancing mining operations and protection of ecological values.

The Chatham Rise extends east for more than 1,000 km from Banks Peninsula to beyond the Chatham Islands. It lies entirely within New Zealand’s Exclusive Economic Zone (EEZ) and has significant seabed deposits of phosphorite and other potentially valuable minerals (Figure 1). The phosphorite deposits, discovered in 1952, formed about 5 million years ago.

Commercial mining of the resource was investigated in the 1980s, but it was not considered viable as there were cheaper sources of phosphorite available and there were limitations in the mining technology. However, recent increases in the market value of phosphorite, driven largely by population increases, growing affluence and demand for protein-rich foods in developing countries, and advances in offshore mining methods mean that it is now economically feasible to mine the Chatham Rise’s phosphorite resource.
Figure 1: The Chatham Rise and CRP’s marine consent application area, including the mining permit area (MP 55549, in black). The total marine consent area is 10,192 km$^2$. 
Mining Approach

The world’s largest dredging company, Royal Boskalis Westminster (Boskalis), has designed a mining system for the project that is based on conventional dredging technology. The specifications for the vessel and the operations plant evolved from CRP’s and Boskalis’ evaluation of available mining methods, the nature of the resource, the weather and wave conditions on the Chatham Rise, and the phosphate market. Managing the impact on the environment was also a key aspect of the design process, of equal importance as technological feasibility, reliability and economic viability.

Mining will be carried out from a specially built or modified vessel. The conceptual layout of the mining vessel and its key mining components are illustrated in Figure 2.

![Mining System Concept](image)

**Figure 2**: Mining system concept. The seabed sediment goes up through the drag-head and riser, is processed on the mining vessel, and the non-phosphorite sediments are returned to the seabed through the sinker and diffuser.
Mining will involve sucking the sediment from the seabed with a trailing suction drag-head (Figure 3). The phosphorite-bearing material will be retrieved from the seabed and mechanically processed on the vessel to separate the coarse phosphatic material from the finer non-phosphatic sediments. No chemicals will be used in the separation process. The non-phosphatic material will be returned to the seabed through another flexible hose. The phosphorite nodules will be retained and when the holds are full, after four to five days of mining, the phosphorite will be transported to a New Zealand port. Annually, there will be about 30 cycles of mining with each cycle separated by a period when the mining vessel transits to and from port. This means that mining operations on the Rise will only occur for the equivalent of about four months a year.

**Figure 3:** Conventional drag-head concept. The drag-head moves to the right in this illustration. Water jets fluidise the seabed sediment (blue arrows) and pumps lift the sediment and water mixture to the riser and onto the mining vessel (brown arrows).

CRP proposes to mine about 30 km$^2$ of seabed per annum throughout the life of mining operations on the Rise, mined as three 2 km wide by 5 km long blocks, to meet its minimum annual production target of 1.5 million tonnes of phosphorite. During the initial 15 years of mining, about 450 km$^2$ of seabed would be mined. In the marine aggregates industry, restricting disturbance to relatively small blocks is common practice as it facilitates the recolonisation and recovery of the seabed in areas where dredging has ceased.
The mining plan also includes provision for mining exclusion areas covering approximately 1,822 km² or about 18% of CRP’s proposed marine consent area. These exclusion areas protect areas of particular scientific or conservation sensitivity and values identified through a marine spatial planning exercise which covered a large portion of the crest of the Chatham Rise. They also provide sources of recolonising species for areas that have been mined.

**Licences, Permits and Consents**

CRP currently holds and has applied for prospecting licences and permits and a mining permit that cover an area of 10,192 km² (Figure 4). These areas have the most potential to become an economically viable mining operation, based on exploration surveys and resource analysis undertaken between 1952 and the early 1980s and six surveys carried out by CRP.

![Figure 4](image)

**Figure 4:** CRP’s proposed marine consent area which includes the two new prospecting permit areas (PP 55971 and PP 55967), the revised area associated with MPL 50270 and the mining permit area (MP 55549). The total marine consent area is 10,192 km².

CRP’s minerals prospecting licence (MPL 50270) covers about 4,726 km² of the Chatham Rise, but CRP has offered to relinquish 1,019 km² of MPL 50270. The mining permit, which was granted in December 2013 by New Zealand Petroleum and Minerals (NZPaM) pursuant to the Crown Minerals Act 1991, covers an area of approximately 820 km² in the western half MPL 50270 (Figure 5).

In November 2013 CRP lodged applications with NZPaM for two additional prospecting permit areas located to the west and east of MPL 50270 (Figure 4). The western permit area covers an area of 1,501 km² and the eastern 4,985 km².
Figure 5: CRP’s mining permit area (MP 55549), highlighted by the heavy red line, is in the western part of CRP’s minerals prospecting licence (MPL 50270, shown by thin black line). The bathymetry of the area is shown, red areas are shallower than the blue areas.

CRP is now seeking a marine consent pursuant to the EEZ Act covering the areas associated with CRP’s mining permit and prospecting licences and permits (a total area of 10,192 km²). A marine consent is required to authorise the environmental aspects of CRP’s proposed mining operations, initially within the mining permit area. If further economic resources are discovered, then mining may proceed to the prospecting areas provided monitoring results and environmental investigations described in marine consent conditions are met and a mining permit is granted. A 35 year term is being sought for the marine consent.

The 10,192 km² marine consent area provides CRP with an opportunity to identify proposed mining exclusion areas over a broader area beyond the mining permit area. These areas were determined as part of a marine spatial planning exercise which identified areas of particular ecological sensitivity or value. The proposed mining exclusion areas, which will not be disturbed during mining, are within the marine consent area and therefore not outside of CRP’s control.

Consultation and the EIA Process

Since it was granted MPL 50270, CRP has consulted with existing interests (as required by the EEZ Act), Iwi and Imi, the Chatham Islands community and other interested parties. Existing interests consist of the commercial fishing industry, including the Iwi fishing industry, and other vessels traversing the mining area. The nature of consultation and the issues raised are outlined in the EIA.

The issues raised during consultation generally reflect the potential impacts identified by the CRP project team in the early stages of project development. These issues have all been considered by CRP, assessed as part of the impact assessment process and, where possible, mitigation measures to address them have been incorporated into the project’s design.
As part of the preparation of this EIA, expert technical assessments have been commissioned by CRP to more fully understand the nature of the Chatham Rise environment and the potential impacts associated with CRP’s proposed mining operations. These assessments are appended to the EIA and, along with the outcomes of consultation, have been used to inform and guide avoidance, remediation and mitigation measures which have also been incorporated into proposed marine consent conditions.

**The Chatham Rise Environment**

The crest of the Chatham Rise is characterised by low sedimentation rates, a consequence of the distance from land and currents at the seabed, and high productivity in the shallow part of the water column resulting from the uplift of nutrient-rich water along the flanks of the Rise. This high productivity supports some of New Zealand’s most important commercial fisheries. The distribution of communities of organisms found on the seabed varies along and across the Rise, and is a function of the nature and shape of the seabed and of oceanographic conditions.

Most of the surface sediments in the marine consent area on the crest of the Chatham Rise are at least five million years old. They are predominantly an unconsolidated mixture of greenish-grey sands and muds containing spatially-varying amounts of phosphorite grains and nodules. The phosphorite formed about five million years ago, and the surrounding sediment is the eroded remains of limestones and chalks that are 10 to 20 million years old. These sediments overlie chalk that is about 25 million years old. The nodules occur as irregularly shaped grains and nodules, 0.5 to 350 mm in size, on and within the seabed’s uppermost sedimentary layer at water depths of 350 to 450 m (Figure 6 and Figure 7).

*Figure 6: Dense concentrations of medium sized phosphorite nodules on the seabed on the crest of the Chatham Rise. The seabed in this photograph is approximately 4 m wide.*
Small outcrops of hard igneous or metamorphic basement rock also occur on the Rise. Other geomorphological features on the Rise include seamounts and elevated banks, furrows created by icebergs, and pockmarks associated with the release of methane from the sediments.

The Chatham Rise lies at the boundary between warm, saline subtropical water to the north and cooler, less saline sub-Antarctic water to the south. The boundary is known as the Subtropical Convergence or Subtropical Front. Although the surface sea conditions can be harsh, these do not influence water movement at the seabed in the proposed marine consent area.

The water chemistry of the Chatham Rise is significantly influenced by the interaction of the water masses on either side of the Rise. The sub-Antarctic waters are enriched in nutrients and this drives the high productivity of the phytoplankton in the surface waters along the crest of the Rise. This high productivity supports commercially important populations of demersal and deep water fish, and is the primary driver of marine food webs on the Rise.

A model of the food chain (trophic model) on the Chatham Rise has been developed and is represented by 36 key groups. The five most important groups are (in order): phytoplankton, small demersal fish, mesozooplankton, hoki and flagellates (a group of protozoans).

There are typically no micro-nutrient limitations in the Chatham Rise’s surface waters and trace element concentrations are low as the waters are remote from terrestrial and atmospheric sources of contaminants.

The physical features of the seabed habitat and the related fauna vary significantly along and across the Rise. Surveys of the seabed show that the seabed communities are usually characterised by a wide range of invertebrate species. Most of these species live within the sediments (infauna) although some live on the seabed (epifauna). Corals and some other seabed organisms need to be attached to solid materials such as phosphorite nodules or rock outcrops. Suitable habitats for these organisms are predicted to be widespread along the crest of the Rise.
The main commercial fisheries of the Chatham Rise are hoki, hake, ling, silver warehou, scampi, orange roughy and oreos. Except for ling, commercial fishing is generally focussed on the flanks of the Chatham Rise. Juvenile fish of a number of these species are reported from the crest of the central part of the Chatham Rise, although many are found more commonly on the flanks and on the crest west of CRP’s marine consent area. Immature and mature scampi are reported along the entire length of the Rise crest, with highest densities in areas west of the marine consent area.

Significant populations of marine mammals and seabirds are supported along the Chatham Rise by the high primary productivity of its ecosystem. Sperm and pilot whales are the whale species most commonly sighted on the Chatham Rise, and habitat modelling indicates the southern flank of the Chatham Rise is probably an important foraging habitat for southern right whales during summer.

Among the wide range of seabirds seen on the Chatham Rise, the magenta petrel (the Chatham Islands taiko), the Chatham petrel and the Chatham albatross are endemic to the Chatham Islands and are likely to use the Rise for foraging or related activities.

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 operations are 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 has 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 have 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 environmentally 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, a 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 (Table 1). 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.

A summary of the impact and environmental risk assessment is in Table 1.

Table 1: Potential impacts and environmental risk after the application of avoidance, remediation and mitigation measures.

<table>
<thead>
<tr>
<th>Potential impact</th>
<th>Assessment of impact</th>
<th>Potential consequence</th>
<th>Potential likelihood</th>
<th>Environmental risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immediate impacts of seabed disturbance from drag-head operations</td>
<td>Neutral to adverse, near-source confined, short-term and reversible</td>
<td>Minor</td>
<td>Possible</td>
<td>Low</td>
</tr>
<tr>
<td>Impacts of sediment disposal on sediment quality</td>
<td><strong>Neutral,</strong> near-source confined, short-term and reversible</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Potential impact</td>
<td>Assessment of impact</td>
<td>Potential consequence</td>
<td>Potential likelihood</td>
<td>Environmental risk</td>
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<tr>
<td>---------------------------------------------------------------------------------</td>
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<td>--------------------</td>
</tr>
<tr>
<td>Impacts of sediment disposal on water quality</td>
<td>Neutral, near-source confined, short-term and reversible</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Benthic habitat and fauna loss within the mining blocks</td>
<td>Adverse, near-source confined, medium to long-term but ultimately reversible</td>
<td>Serious</td>
<td>Almost certain</td>
<td>Serious</td>
</tr>
<tr>
<td>Sedimentation impacts on benthic habitats</td>
<td>Adverse, near-source confined, medium-term and ultimately reversible</td>
<td>Medium</td>
<td>Almost certain</td>
<td>High</td>
</tr>
<tr>
<td>Impacts on conservation values, namely marine mammals and seabirds</td>
<td>Neutral to adverse, near-source confined (i.e., where and when mining is occurring), short-term and reversible</td>
<td>Minor</td>
<td>Unlikely</td>
<td>Low</td>
</tr>
<tr>
<td>Impacts on seabirds from oil spills</td>
<td>Adverse, near-source confined (given controls in place, medium-term and reversible)</td>
<td>Serious</td>
<td>Rare</td>
<td>Low to Medium</td>
</tr>
<tr>
<td>Impacts on conservation values, namely cold water corals (i.e., separate from the loss of benthic habitat, including corals, within the mining permit area)</td>
<td>Neutral given distribution throughout the Chatham Rise and EEZ. Locally adverse (i.e., within the mining area) as assessed in relation to benthic habitat and fauna loss</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Impacts on fisheries resources</td>
<td>Adverse, near-source confined (i.e., within the mining areas), short-term and reversible</td>
<td>Medium</td>
<td>Unlikely</td>
<td>Low</td>
</tr>
<tr>
<td>Impacts associated with vessel and mining related noise</td>
<td>Neutral, near-source confined, short-term and reversible</td>
<td>Minor</td>
<td>Possible</td>
<td>Low</td>
</tr>
<tr>
<td>Vessel lighting impacts</td>
<td>Adverse, near-source confined, long-term (i.e., as long as the mining occurs) and reversible</td>
<td>Minor to Serious (depending on bird species)</td>
<td>Unlikely</td>
<td>Low to Medium</td>
</tr>
<tr>
<td>Impacts associated with vessel waste discharges</td>
<td>Neutral given compliance with MARPOL and associated regulations</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
### Social, Cultural and Economic Assessments

The potential social and economic impacts are considered to be positive. Mining phosphorite on the Chatham Rise will improve New Zealand’s security of supply for phosphate fertilizer. The project is predicted to reduce phosphate imports by NZ$85 million per year, boost GDP by NZ$280 million per year and implementing the project over 15 years, if it occurred now, would mean that New Zealand would be NZ$900 million richer.

Chatham Islanders have a direct connection to the Chatham Rise and the activities that occur there. For this reason, CRP has consulted with the Chatham Islanders to understand the issues and benefits that they consider may be associated with the project. Beneficial social impacts that CRP have either committed to or are considering as part of its environmental compensation for the project, following consultation with the Chatham Islanders, include employment opportunities, subsidised fertiliser for Chatham Island farmers, educational scholarships, and support of Chatham Island-based ecological improvement projects. Other potential social impacts identified during consultation include impacts on the Chatham Islands’ fishing industry, including the rock lobster and paua fisheries. These potential impacts have been assessed as a very low environmental risk.

Potential impacts on cultural values have been outlined by Ngati Mutunga o Whakekauri (Ngati Mutunga) in their draft Cultural Impact Assessment and Hokotehi Moriori Trust (Moriori) in a letter to CRP. Both Ngati Mutunga and Moriori, who claim the Chatham Islands in their rohe, outline a range of issues that they associate with the proposal. The issues largely revolve around the mining technique, potential impacts on the marine environment including fisheries, rangatiratanga and economic development opportunities. These are similar to the issues raised by other Iwi, particularly impacts on the marine environment and impacts on the broader fishery resource, although Te Runanga o Ngai Tahu have also identified impacts on marine mammals, a taonga species, as being of cultural significance. Ngati Mutunga and Moriori also advise that they wish to receive more technical information in relation to these potential impacts and they wish to continue to develop a relationship with CRP. CRP has committed to do so.

Existing interests, given the EEZ Act’s definition, include the fishing industry and other vessels traversing the area. Potential impacts on existing interests are directly connected to potential impacts to the fisheries, which are considered to be of low environmental risk. Provided international and national navigational safety laws are complied with by all vessels in the area, conflict between CRP’s mining vessel and other vessels will not occur.

Other positive impacts associated with CRP’s proposed mining operations include reduced nutrient run-off if Chatham Rise phosphorite is applied directly to land (rock phosphate is not as water soluble as superphosphate), reduced cadmium build up in soils (Chatham Rise phosphorite has low
cadmium levels), a reduced carbon footprint from shorter transport distances compared to current transport distances for sources of rock phosphate imported into New Zealand, an improved knowledge and understanding of New Zealand’s marine environment, and increased employment opportunities.

**Mitigation Measures**

As outlined above, the measures to avoid, remedy or mitigate the potential impacts associated with CRP’s proposed mining operations include:

- A mining system designed to avoid and minimise potential impacts.
- Mining exclusion areas, defined through a broad marine spatial planning exercise, have been incorporated into the proposal to avoid impacts on areas of particular sensitivity or value.
- Ensuring the mining blocks in any year, during the first five years of mining, are sufficiently separated to avoid sedimentation impacts on other blocks. Monitoring will assess the actual impacts of sedimentation.
- Evaluation of the feasibility and viability of creating hard substrate habitat to enhance recolonisation, and, if viable, creating such habitat.
- Prior to each deployment of the mining system, a 200 m radius from the mining vessel will be checked for marine mammals. If they are observed within this zone then mining will not commence until the area has been clear for at least 30 minutes.
- Adoption of vessel lighting mitigation strategies to minimise impacts on seabirds.

**Environmental compensation**

Assessment of the potential impacts of the CRP’s mining project has shown that the benthic communities in the mining blocks will be removed by the drag-head, and the communities adjacent to the mining blocks will also be adversely affected as a result of sediment deposition. Recolonisation of soft-sediment communities is expected to occur within several years.

As these impacts cannot be avoided, remedied or mitigated, CRP proposes to implement an environmental compensation package that will include establishing a trust that will receive $200,000 per annum from CRP while mining operations are occurring. The trust’s objectives will focus on ecological sustainability and enhancement, preferably in relation to the marine environment of the Chatham Rise or the Chatham Islands. The trust will also provide financial support for targeted research connected to the impacts of CRP’s mining operations.

**Consent conditions**

The conditions proposed by CRP include the application of adaptive management practices to guide the mining operations. Adaptive management provides for monitoring of the activities and impacts of the mining operation, and uses the results to guide operational practices and policies to minimise impacts on environmental resources.

Adaptive management decisions will be guided by the results of monitoring of the environmental effects of the project. Monitoring will test whether the actual impacts are similar to the predicted impacts. Monitoring will include collecting baseline oceanographic information, measuring water turbidity, and observing changes in the seabed ecology.

One component of the adaptive management regime is that mining will be restricted to the area associated with the existing mining permit area for at least the first five years of mining operations. Mining will only be undertaken outside of that area and within the prospecting permit / licence areas, if an economic resource is identified, monitoring that has been carried out shows that the
impacts of mining are as predicted, investigations of the new area as specified in the consent conditions have been completed and CRP have obtained a new mining permit covering the additional area to be mined. There will be no significant changes to the mining plan or operations, other than those that may arise from the adaptive management conditions and that result in reduced environmental impacts or increased mining efficiency.

CRP has proposed other consent conditions that stipulate reporting requirements and establish an Environmental Reference Group to ensure that stakeholders are fully informed about the project and the results of mitigation and monitoring activities. CRP have also committed to use its best endeavours, in conjunction with interested parties, to identify legal mechanisms to protect areas identified through the marine spatial planning exercise, both inside and outside the marine consent area, from seabed disturbances.

CRP’s proposed environmental management approach is consistent with the International Marine Minerals Society’s Code for Environmental Management of Marine Mining. These management processes allow for review and refinement of mitigation measures throughout the life of the project.

**Conclusion**

CRP has developed a plan to mine phosphate from the Chatham Rise. It is technologically robust, environmentally sound, economically attractive and socially responsible. The mining plan is based on scientific research and consultation with stakeholders. The mining system will be operated according to industry best practice. Mining operations will be governed by policies and procedures, including an environmental management system, that are designed to minimise, avoid, remedy or mitigate environmental impacts. The environmental management system is based on the principles of adaptive management, and includes mitigation strategies, a comprehensive monitoring programme, and an environmental compensation package.

Any adverse impacts beyond the mining area will be avoided, remedied or mitigated and the life-supporting capacity of the wider Chatham Rise environment will be safeguarded (irrespective of the loss of benthic habitat within the mining blocks). Within the mining blocks, the benthic environment will be adversely affected. As a consequence, avoidance, remediation and mitigation measures include the provision for mining exclusion areas to avoid impacts on areas of particular sensitivity or value, and assessment of the feasibility of restoring hard substrate removed by mining. These measures will not fully offset the loss of habitat within the mining areas, and a package of environmental compensation is also proposed.

CRP’s proposed mining operations will achieve the sustainable management purpose of the EEZ Act (section 10). Development of the phosphorite resource will contribute significantly to New Zealand’s economy, and use of the product in New Zealand will have environmental benefits from reduced levels of cadmium in the soil and reduced runoff of phosphorus to waterways. Other than the phosphate resource that is mined, the natural resources of the Chatham Rise will be sustained for future generations.