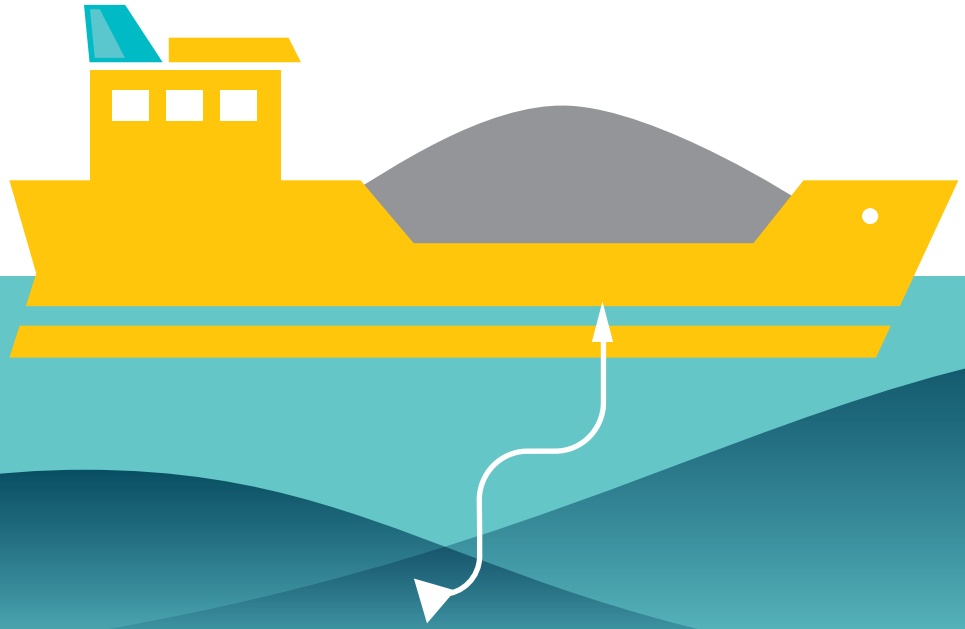
Seabed Mining

This information sheet explains how government agencies manage offshore seabed mining activities in New Zealand.



New Zealand Government

Department of Conservation *Te Papa Atawbai*

NEW ZEALAND PETROLEUM & MINERALS

Ministry for the Environment

Environmental Protection Authority *Te Mana Rauhī Taiao*

Nō te rere moana Aotearoa MARITIME NEW ZEALAND

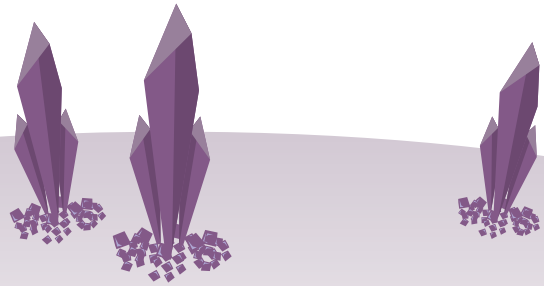
WORKSAFE NEW ZEALAND

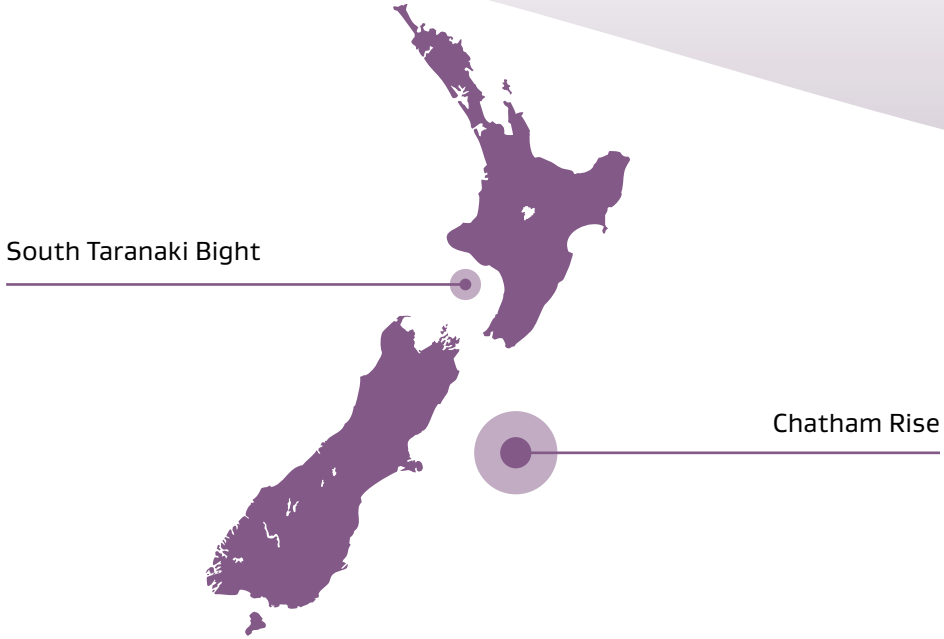
Introduction

Seabed mining is the process of extracting mineral deposits from the ocean floor. The potential of seabed mining gained international interest in the 1960s and 70s when deposits of nodules (mineral concentrations) containing valuable minerals like copper, nickel and manganese were found under oceans throughout the world. At the time however, there wasn't the technology to mine these resources in a commercially viable way.

More recently, interest has shifted toward hydrothermal vents systems and active underwater volcanoes as the source of minerals. These are called "black smokers" and occur when hot hydrothermal fluids meet cold seawater. The continuing formation of black smokers which can contain copper, zinc, gold and silver could potentially become a sustainable and replenishing supply of these minerals.

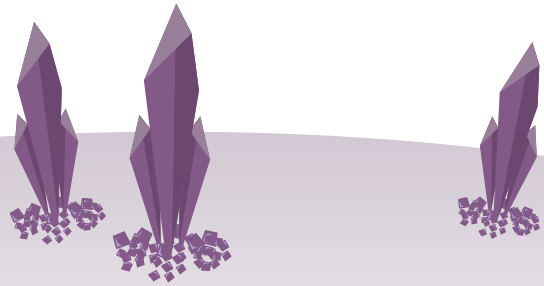
Seabed mining is not a new mining technique in New Zealand. Small-scale offshore sand mining is an established practice in the Kaipara Harbour and Pākiri beach. This sand is used for construction, concrete and to replenish beaches.





Approval is currently being sought for two major offshore minerals projects; one to extract phosphate nodules from the Chatham Rise and the other to mine iron sands in the South Taranaki Bight.

Seabed mining, at the scale and depth of these two projects, is new to New Zealand. The closest equivalent activity to these projects currently taking place in New Zealand, however, would be the extensive dredging of harbours and shipping lanes that takes place on a regular basis to allow for cargo and tourist shipping. These activities are typically regulated by regional councils, some of which have experience in investigating and setting environmental conditions around dredging activities.



Extraction methods

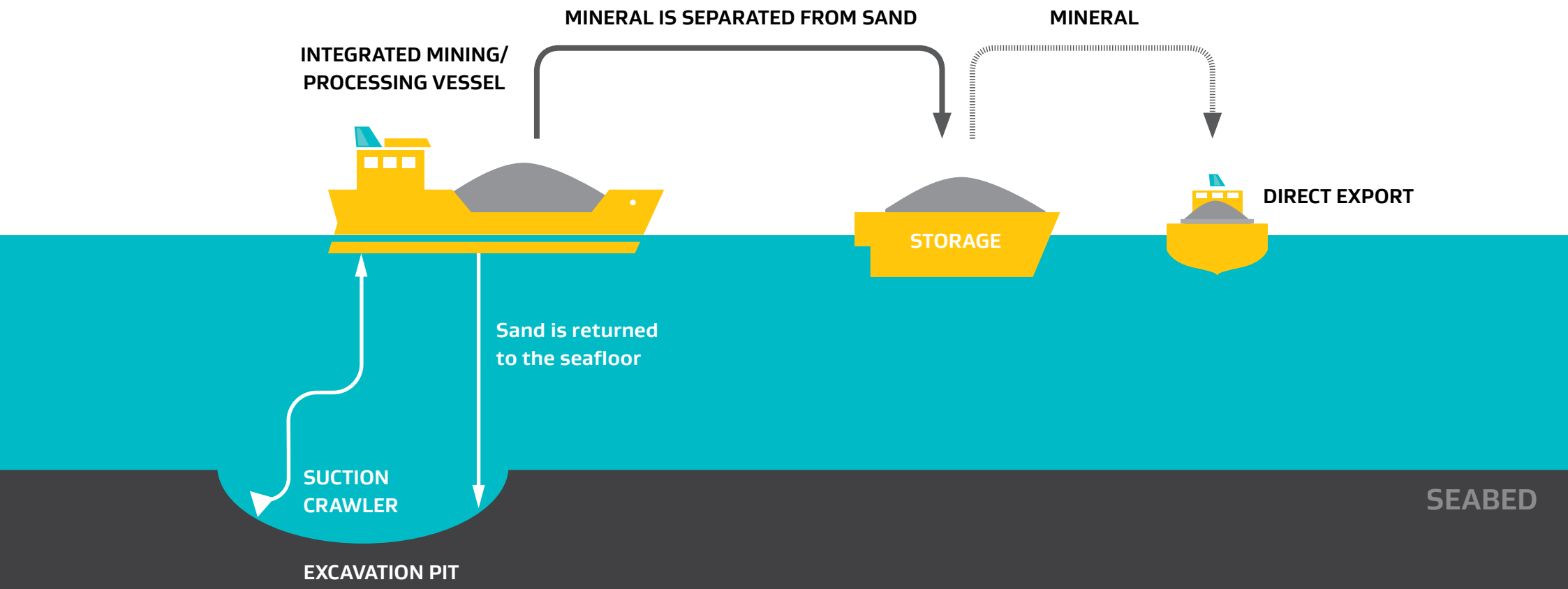
Traditionally, seabed mining has been conducted using either hydraulic suction pumps or bucket dredging systems.

Hydraulic suction uses a suction pipe which is lowered to the seafloor and carries sediment and nodules up to a processing vessel. The targeted minerals are extracted and another pipe runs from the vessel to the seafloor returning the tailings (surplus sediment) to the mining site. The bucket system operates much like a conveyor-belt, running from the seafloor to the surface where a processing vessel again extracts the targeted minerals, and returns the tailings to the ocean. Both these systems are used in shallow waters.

Advances in technology are allowing operators to consider mining mineral deposits at increasingly greater depths. Remotely operated vehicles (ROVs), 'crawlers' and trailing suction hopper dredge systems are now making deeper mineral deposits viable to mine. Crawlers drive along the seabed and suck sediment up through a flexible hose to the processing vessel. This method is much more precise than traditional methods and means operators only have to pass over a targeted area once. Trailing suction hopper dredge systems use suction pipes fitted with a 'draghead' that runs from the vessel to the seabed. The draghead allows the operator to regulate the mixture of sand and water that it takes in.

In New Zealand, Trans-Tasman Resources Limited plans to use the application of crawler technology at a depth of 40m for its ironsands project. Chatham Rock Phosphate is investigating the viability of using a trailing suction hopper dredge system to extract phosphorite from the Chatham Rise at a depth of 400m.

Process of seabed mining



How is seabed mining regulated?

Multiple government agencies share the responsibility for managing seabed mining activities in New Zealand's offshore waters.

If an operator wants to search for or mine minerals on the seabed, they need to obtain a prospecting, exploration or mining permit from New Zealand Petroleum and Minerals (NZP&M). NZP&M manages the Government's oil, gas, mineral and coal resources in accordance with the Crown Minerals Act 1991. Before granting permits, NZP&M assesses an operator's proposed work programme as well as its technical and financial capability, and compliance history. It also undertakes a preliminary, high level assessment of an operator's capability and systems that are likely to be required to meet applicable health, safety and environmental legislation.

Mining activities in the Exclusive Economic Zone (EEZ) and Continental Shelf (CS) are regulated by the Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012 (EEZ Act). The EEZ is the area from 12 to 200 nautical miles offshore and the CS is the seabed and subsoil from the 12 nautical mile limit out to the end of New Zealand's submerged landmass.

Under the EEZ Act, the disturbance or removal of material from the seabed and the deposit of tailings to the sea floor as a result of the mining activity are restricted activities and require a marine consent from the Environmental Protection Authority (EPA). The EPA is the government agency responsible for regulating the environmental impact of restricted

activities such as mining in the EEZ and CS. Mining companies are required to submit detailed impact assessments as part of the marine consent process. This includes identifying any effects of undertaking the proposed activities on the environment and existing interests and the measures they will take to avoid, remedy or mitigate any adverse effects.

Some prospecting and exploration activities are permitted without a marine consent under the EEZ Act if certain conditions prescribed in regulation are met.

Seabed mining is a publicly notified activity under the EEZ Act meaning that the public get the opportunity to raise any issues or concerns and provide any relevant information during the submission process. Members of the public can then speak to those submissions at a hearing.

The EPA may grant consent and attach conditions to manage the effects of the proposed activity on the environment and existing interests. The EPA can also decline the consent. If an application is granted and conditions are set, the EPA will monitor and enforce compliance with those conditions.

If the mining activity is in territorial waters, which extend from the coast out to the 12 nautical mile limit, Regional Councils are responsible for managing the effects under the Resource Management Act 1991 (RMA). Operators are required to obtain resource consent from the relevant Regional Council which undertakes a similar type of assessment of the effects from a proposed activity as that carried out by the EPA for a marine consent.

The regulation of health and safety on seabed mining operations falls under the Health and Safety at Work Act 2015 (HSW Act). In this context, this Act is administered by both WorkSafe New Zealand (WorkSafe) and Maritime New Zealand (MNZ). MNZ administers the HSW Act aboard ships while WorkSafe have jurisdiction for any work related to seabed mining which is not on board a ship – for example, any diving operations carried out relating to seabed mining exploration.

Both ships and installations may be used in seabed mining operations. Ships need to comply with all applicable regulatory requirements under the Maritime Transport Act 1994 (MTA) and maritime and marine protection rules. The provisions of the MTA and rules are also administered by MNZ.

Offshore installations involved in seabed mineral activities are also subject to regulation under the MTA and associated marine protection rules. This includes requirements for:

- an operator to hold a certificate of insurance for liability cover for any potential pollution damage that arises from its installations or operations
- the operator must have an oil spill contingency plan (OSCP). This plan sets out the operator's procedures and practices aimed at preventing and reducing the impacts from any accidental spills of oil.
- relevant International Oil Pollution Prevention (IOPP) certificates for pollution prevention equipment onboard the installation

The return of tailings to the sea floor as a result of the mining activity falls under the jurisdiction of the EPA or relevant regional council and is considered as part of the marine or resource consent process.

The disposal of non-operational waste from installations in the EEZ or CS is covered by the Exclusive Economic Zone and Continental Shelf (Environmental Effects—Discharge and Dumping) Regulations 2015 administered by the EPA. Operators must have a garbage management plan, maintain a garbage record book and display placards indicating to crew the discharge requirements applicable to the installation.

For more information, see our *Who does what in New Zealand's offshore waters* factsheet.

Environmental effects

The extent of disturbances and impact on local seabed ecology is dependent on many factors including the size of the mining area, the extraction and deposition method used, the type of sediment on the seabed and how exposed the area is to natural disturbance from currents and waves.

As part of the consent process, the EPA or relevant regional council will consider the potential effects on the environment of the proposed mining activity including any mitigation proposed to minimise effects.

Some of the potential environmental impacts of seabed mining may include:

Disturbance to seabed habitats

The removal of any material from the seafloor or subsoil will cause some degree of disturbance to benthic organisms and their habitat. Different habitats will vary in their vulnerability to disturbance.

Plumes

Plumes are “clouds” of sediment that can form in the water column when tailings are either discharged from the vessel or near the seafloor when the extraction device moves along the seabed.

Plumes increase the turbidity or cloudiness of the water, and this can smother benthic organisms and fish.

The size and extent of plumes can be controlled through mining technology and discharge techniques – for example returning material close to the seabed instead of high in the water column from the back of a vessel. Modelling of waves, tidal action and ocean currents enables operators to predict the size and extent of plumes.

Effect on marine mammals and fish stocks

Noise and vibrations generated by the mining machinery or the processing vessel can potentially impact nearby marine mammals and fish. The effect depends on the frequency of the noise generated and how loud it is but can range from minimal impact, to changes in behaviour, to significant trauma.

Wave formation and erosion

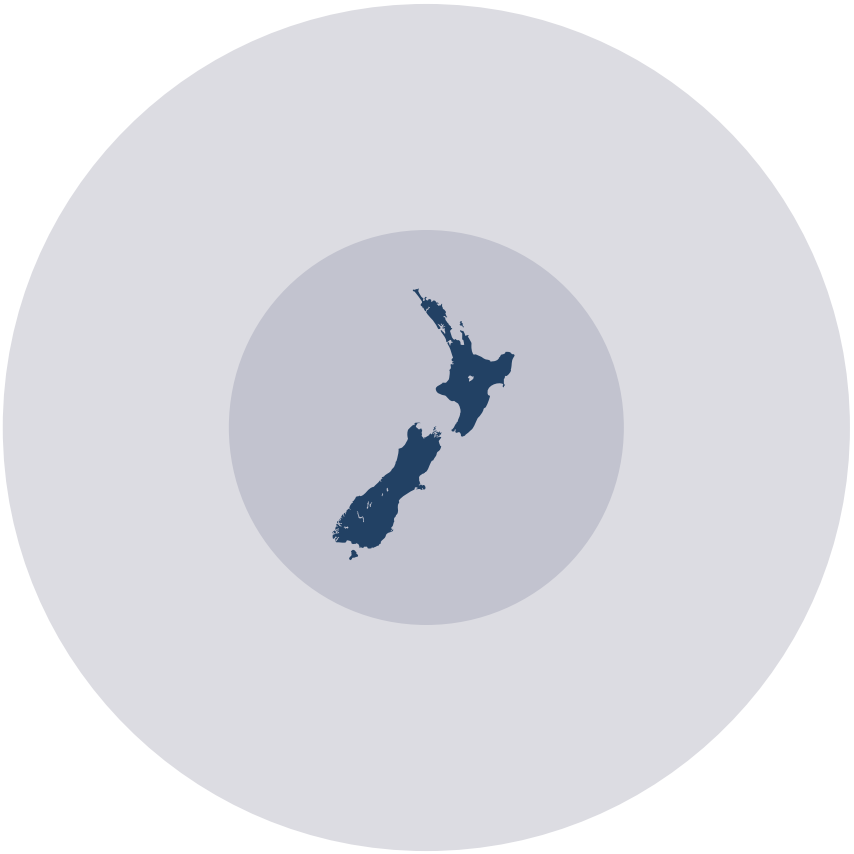
Depending on the mining methodology employed, removal and deposition of seabed material may result in trenches or pits and mounds on the seabed. These formations have the potential to impact on wave action and cause erosion, depending on their size and location.

Effects on existing interests

As part of the marine consent process, the EPA will also consider the potential effects on existing interests of the proposed mining activity including any mitigation proposed to minimise effects.

Existing interests include operators of any lawfully established existing activity such as fisheries, those with an interest in the settlement of an historic or contemporary Treaty of Waitangi claim and holders of protected customary rights or marine titles recognised under the Marine and Coastal Area (Takutai Moana) Act 2011.

NZ's seabed prospectivity



New Zealand's offshore waters cover an area of more than six million square kilometres – more than 20 times our land area and the world's fourth-largest area of seabed.

The extent and location of resources on the seabed is not well understood at present.

Minerals known to occur in New Zealand's seabed include:

Aggregate, ironsand and gold

Deposits of aggregate (sand and gravel), ironsand and gold are found around New Zealand in shallow water (generally less than 100 metres deep), often close to the coastline.

Large deposits of ironsand have been identified in offshore Taranaki and Northland. Aggregates are less valuable but are locally important for beach replenishment, landfill and cement.

Ferromanganese and phosphorite nodules

Nodules, found in deeper water, are mineral concentrations resulting from chemical reactions between the seafloor and the seawater. Ferromanganese nodules and phosphorite nodules are the most well-known examples in New Zealand.

Ferromanganese nodules are valuable because they potentially contain cobalt, nickel and copper which have a variety of applications.

Phosphorite nodules can be used as a fertiliser for the agriculture sector which is attractive as New Zealand relies on imported phosphate, and because international demand is sufficient to consider export.

Sulphide deposits (black smokers)

Sulphide deposits, also found in deep water, are the product of hydrothermal activity and can contain, copper, zinc, gold and silver.

Active volcanism occurs along the Tonga-Kermadec Arc and deposits are known along volcanic areas extending about 2,500 km north of New Zealand.

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