Form 3: Initial environmental assessment and sensitive environments contingency plan

*Regulation 11(c), Exclusive Economic Zone and Continental Shelf (Environmental Effects–Permitted Activities) Regulations 2013*

**How to use this form:**

This form should be completed by organisations planning to carry out marine scientific research, prospecting, or exploration. It fulfils the initial environmental assessment and contingency plan requirements of Schedule 2 of the Exclusive Economic Zone and Continental Shelf (Environmental Effects – Permitted Activities) Regulations 2013.

This form must be provided to the Environmental Protection Authority (EPA) at least 5 working days before commencing the activity.

Note: Items marked in italics are non-compulsory fields; however, inclusion of this information will assist the EPA in processing this form.

Please note that this completed form, once received and processed by EPA, will be posted on the EPA website.

**Submitting in hard copy:**

If you wish to provide this form in hard copy, please post your completed form to: Environmental Protection Authority, Private Bag 63002, Wellington, 6140.

**Submitting electronically:**

If you wish to provide this form electronically, please email your form to: eez.compliance@epa.govt.nz

Any form submitted electronically should be attached to an email that sets out:

- The details of the person undertaking the permitted activity (the operator);
- The name of the person supplying the completed form; and
- A statement that the person is authorised to supply the form on behalf of the operator.

Note: there is an 8 MB limit on electronic files submitted via email.

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All forms prescribed by the Exclusive Economic Zone and Continental Shelf (Environmental Effects – Permitted Activities) Regulations 2013, as well as suggested templates for providing other information, may be viewed and downloaded from our website at www.epa.govt.nz or requested by contacting us:

Private Bag 63002, Wellington, 6140
Email info@epa.govt.nz
Ph +64 4 916 2426
Fax +64 4 914 0433

www.epa.govt.nz
**Operation name:**

Name used by operator to reference the activity described in this form: **TAN1313**

**Details of person undertaking permitted activity**

<table>
<thead>
<tr>
<th>Company name:</th>
<th>GNS Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact person:</td>
<td>Dr Vaughan Stagpoole</td>
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<tr>
<td>Phone number:</td>
<td></td>
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<tr>
<td><strong>Mobile number:</strong></td>
<td><strong>Fax number:</strong></td>
</tr>
<tr>
<td>Physical address:</td>
<td></td>
</tr>
<tr>
<td><strong>Postal address</strong> (if different):</td>
<td><strong>Postcode:</strong></td>
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<tr>
<td>Email address:</td>
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</table>

**General description of permitted activity**

**Type of activity:**  
*Marine scientific research.*

We will undertake research along the southern part of the Colville Ridge, a tectonic feature that begins ~200 km offshore, northeast of Auckland and which extends for ~1500 km towards Fiji, in water depths ranging from 700 to 3000 m below sealevel.

The aim of this survey is to understand the geological and tectonic setting of the region, how and when the Colville Ridge formed, and to construct a framework within which research on volcanic processes and the potential formation of seafloor minerals can be placed. We will also be identifying areas that could be followed up with surveys by AUVs, ROVs, and possibly manned submersibles.

We have identified an area of seafloor to be swath mapped along survey lines with a total length of ~3000 km using an EM302 multibeam system, in addition to collecting gravity and magnetic data along the same survey tracks. Sea floor samples may be taken from up to 10 sites in the survey area with a rock dredge.

**Description of methods to be used to undertake the activity:**

**Multibeam (swath) bathymetry**

Multibeam sonar measures the depth to the sea floor by analysing the time it takes for sound waves to travel from a boat to the seafloor and back. It is now the standard method for obtaining a detailed map of the seabed. Multiple beams make it possible to map a broad swath of the seabed under the ship (in this case ~5x water depth), in contrast to single-beam sonar depth sounders that only map points directly below the ship.

**Sub-bottom profiler (3.5 kHz)**

The sub-bottom profiler is similar to a single-beam sonar depth sounder, but uses a slightly lower frequency that is able to image and characterise geological formations just beneath the seafloor. The image obtained is typically restricted to just a few metres below the seabed, and possibly up to 50 m below the seabed in perfect conditions. The type of source (frequency, power) is quite different (less powerful, higher frequency) to that used in petroleum exploration.
(i.e., they image to 5-10 km depth).

**Rock Sampling**

The removal of samples from a hard seabed will be done using a purpose built dredge. The rock dredge is approximately 1 m wide and made of metal chain links attached to a simple heavy frame. Because of the coarse chain links, finer material falls back to the bottom, leaving only large (typically 40-400 mm) objects in the bag. The dredge is winched up to the surface and samples are sorted and preserved on the ship’s deck.

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**Location of permitted activity**

**Co-ordinates of area where activity will be undertaken:**

(latitude and longitude)

[Map showing proposed survey lines for the southern Colville Ridge]

**Description of the current state of the area and the surrounding environment, including any known sensitive environments:**

Mixed rocky and soft sediment sea bottom at <2500m water depth. To our knowledge, this area has never been sampled previously. However, we expect that we will encounter relatively old, hard volcanic rocks along the Colville Ridge (i.e., depths above 2500 m).

**Description of the likely effects of the activity on the environment:**

Transient and highly-localised seabed disruption at the point of sampling. Rock dredge effects are confined to a 1m-wide track for a distance of up to 400 m maximum, and commonly much less. If a sandy or muddy bottom is encountered, sediment will be disrupted as it washes through the dredge, the water column will be locally turbid, and then sediment and any small organisms will settle out (it is rare to catch a large organism). If a hard bottom is encountered then the bucket is designed to gather or break off and collect a few rocks, but is likely to leave much of the dredge track unaffected. When dredging over hard substrates, like volcanic rock, the dredge commonly touches down on several occasions and is not always dragged across the seafloor. Multibeam swath bathymetry mapping, and acquisition of gravity and magnetic data has no effect on the environment. In summary, the likely effects of our proposed activities are very minor to negligible.
Identification of sensitive environments

Describe any sensitive environments likely to exist in the area where the activity will be undertaken:

Most (c.11 days) of the expedition is devoted to map and simultaneously perform magnetic and gravity measurements, all of whose methods are shipboard methods and do not touch the seafloor. To ground truth the new measurements 10 dredge stations (c. 2days) spread across the mapped area of the southern Colville Ridge are anticipated. It is likely that the sub-bottom profiler will not be used.

To our present knowledge, the Colville Ridge represents the old (proto-) Kermadec arc, which has been volcanically active between ~17-6 Million years (based on two ages on the same sample) and hence no volcanic activity or signs of hydrothermal activity, representing a unique marine environment have been identified.

From previous dredging experience further north (for example during TAN1213) we will encounter hard, cemented moderately altered volcaniclastic material containing clasts of volcanic rock with no to little biology living at the surface.

As the Colville Ridge has been volcanically active there is a little chance to dredge ancient hydrothermal mineralisation, which again is very likely to have no or only little biology living on the surface.

In summary, it is very unlikely that any sensitive environments will be encountered during the 10 proposed dredging operations.
Contingency plan

Specify measures that could be taken to avoid, remedy, or mitigate the adverse effects of the activity on sensitive environments:

<table>
<thead>
<tr>
<th>a) Can the activity be undertaken in another place?</th>
<th>Yes / No*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explain: Each geologic feature is unique and will give scientific insight about that specific region. The part of the Colville Ridge to be surveyed is completely unexplored and no detailed maps or rock samples exist. No other area can be sampled to undertake this research.</td>
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<thead>
<tr>
<th>b) Can the activity be undertaken in a way that reduces the amount of contact with the seabeled?</th>
<th>Yes / No*</th>
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<tbody>
<tr>
<td>Explain: Rock samples will be dredged at up to 10 stations to ground truth the newly produced map. Dredge only touches the seafloor for a maximum of ≈400 m and will impact the seabeled at that site, but has overall little impact on the environment. This is the only method available to recover volcanic rocks for scientific purposes. A submarine or ROV could be used, but this is beyond the capability of the vessel, the research program funding, and is impractical for this type of survey where there is minimal impact on the seabeled.</td>
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<thead>
<tr>
<th>c) Can different methods be used in undertaking the activity to lessen its effects on the sensitive environment?</th>
<th>Yes / No*</th>
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<tbody>
<tr>
<td>Explain: The seabeled sampled is 6-17 Ma old volcanic terrain with no active volcanic or hydrothermal activity. There are no known sensitive environments in the survey area. We plan to undertake one rock dredge cast for each locality. If we discover a sensitive environment we will note the location and avoid making a second dredge cast in the same place.</td>
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<tr>
<th>d) Can the activity be undertaken in a way that lessens its effects in the sensitive environment?</th>
<th>Yes / No*</th>
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</thead>
<tbody>
<tr>
<td>Explain: There are no known sensitive environments in the survey area. A submarine or ROV could be used, but this is beyond the capability of the vessel, the research program funding, and is impractical for this type of survey where there is minimal impact on the seabeled. Each sampling attempt will be as short as possible to minimise impact on the seabeled.</td>
<td></td>
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</table>

* Select one

4 November 2013

Signature of authorised contact person: Vaughan Stagpoole

Date

Name: Vaughan Stagpoole
Title: Head of Department of Marine Geoscience

Note: A signature is not required for electronic (email) forms.