

Otago Regional Council  
70 Stafford Street  
Dunedin 9054

Attention: Joanna Gilroy and Hilary Lennox

Dear Joanna and Hilary

## **Resource Consent for Te Rauone Beach Management Scheme: Coastal Process Effects Review**

### **1 Purpose**

Port Otago have submitted a resource consent application for a beach management scheme at Te Rauone Beach that includes the construction of three rock groynes and the placement of dredged sand. The consent application is supported by an AEE prepared by GHD Ltd. with specialist reports from Beca.

On behalf of Otago Regional Council, Hilary Lennox commissioned Tonkin + Taylor to do a coastal process effects review of the relevant parts of the application for you as our client. This assessment was carried out by Richard Reinen-Hamill, our technical director; coastal engineering and this report sets out our findings and recommendations.

### **2 Scope of work and key findings**

The review is based on a desk-top review of the application documents and focuses on the technical details of proposed works. We have not been provided the referenced documents or explicitly reviewed historic reports and information. Our assessment includes whether proposed works are to an engineering standard, that all required studies have been undertaken and that the works are supported by these studies.

We have identified some matters of consideration regarding specific details and layout that should be considered by the designer, but agree that overall, the proposed capital and maintenance activities as set out in the design and effects assessment reports prepared by Beca should ensure the retention of a beach along this stretch with no significant adverse effects to the adjacent physical coastal environment for design life of the project.

### 3 Assessment

#### 3.1 Problem definition

The Coastal Process Assessment report (Beca, 2019a<sup>1</sup>) included as Appendix F of the application largely relies on previous reports and studies to identify the issues affecting this stretch of coast and concludes that erosion is a result of a combination of natural processes acting in combination with historic and more recent changes.

The plot of historic shorelines included in the Coastal Process Assessment report clearly identifies the north to south shift in sand within the confines of the embayment, with the primary drivers comprising modifications to the harbour entrance increasing energy from the north, and the groynes at Wellers Rock reducing the return flow of sand to the northern part of the embayment.

We note, based on visual area differences, there appears to be more sand accumulated in the southern embayment than lost from the northern part of the beach. This suggests there may be sand accumulation from the subtidal area as well.

#### 3.2 Design

##### 3.2.1 General

The Detailed Design report (Beca, 2019b<sup>2</sup>) sets out the design philosophy and approach for the preferred option. We note that the design life for the proposed work is 20 years and that regular monitoring, sand transfer/top-ups and groyne maintenance is anticipated and identified as a requirement in the design report. We note that the design life is shorter than the usual full term of a resource consent (35 years) and assume the consent conditions will reflect the shorter design life. An allowance of 0.1m has been made for sea level rise over the design life.

The design report includes references to standard and internationally recognised design guidance and methods. The design report is descriptive of the design process, rather than providing detailed calculations and analysis for review. This means that detailed checks cannot readily be made, so we have relied on expert judgement in this review. The resulting design wave heights appear reasonable and it is assumed that this is inclusive of 0.1m sea level rise. However, the peak wave period of 3s for a 1.2m significant wave-height seems too short as it creates an unstable/over-steepened wave height. The grain size selection of 0.23mm based on sampling in the channel also seems reasonable to match the stated 0.2mm beach sands, although no data/grading information has been presented.

##### 3.2.2 Plan form

The planform shown on the General Arrangement Plan (3311121-CA-103) shows the location of the proposed three groynes and the nourished beach profile. There are no detailed wave analysis calculations included, but the general planform looks reasonable. However, there are a few matters of note. We note that in harbour environments, due to the short crested nature of the wind generated waves, that refraction is less likely to occur than in swell conditions, so the groynes are more likely to act to shelter wave action from particular areas of the beach. However, it is possible that the structures will refract and diffract boat wakes.

We note the southern groyne could be more ideally located on the existing armoured edge some 10 to 15m to the south, but assume the proposed location is due to property boundary matters, but

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<sup>1</sup> Beca (2019a) Te Rauone Beach Management Scheme – Assessment of Effects on Coastal Processes, unpublished report for Port Otago Ltd, 29 November 2019.

<sup>2</sup> Beca (2019b) Te Rauone Beach Management Scheme – Detailed Design Report, unpublished report for Port Otago Ltd, 20 November 2019



armour layer to assist in reducing sand migration. I note this detail could be improved by a more conventional geotextile wrap around the core of the rock armour (see Figure 2). The toe burial depth, crest and slopes seem appropriate. However, the toe detail on the long sections of sheet 3331121-CA-104 does not seem to match the cross-section details on 3331121-CA-105.

Rock armour is proposed with a Dn50 of 0.5m and M50 of 330kg. On the seaward end the armour is sloped at 2.5(H):1(V) and is likely to have a high degree of permeability. This rock armour should be stable for the design wave height, even with a longer wave period.

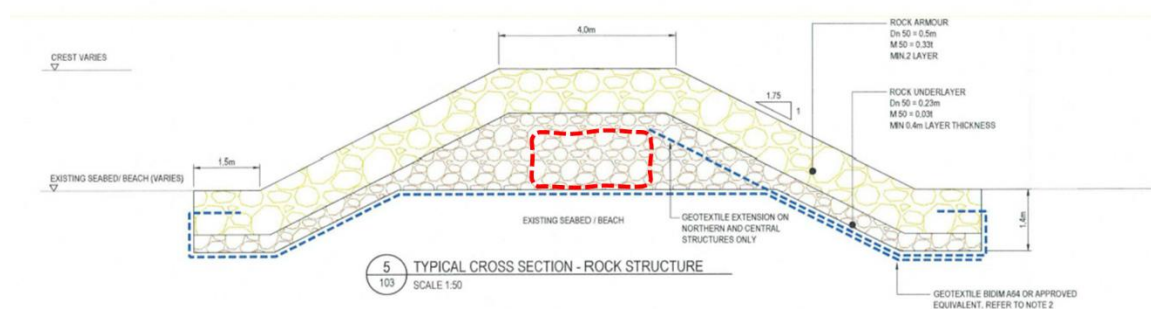


Figure 2 Red dashed "conventional geotextile wrapped core alternative"

### 3.2.5 Variation in beach profile and maintenance

The potential for variation in beach profile is clearly identified, as is the requirement for ongoing top-ups and maintenance.

## 4 Potential effects on the coastal environment

We agree that the works, including the ongoing monitoring and maintenance, are likely to result in an improved amenity area of this section of beach. Construction effects are limited to the construction period and can be managed through appropriate construction management approaches. It will be important to ensure sand gradings are taken and confirmed to match the design assumptions from the proposed borrow area.

The effects assessment is included in Beca (2019a) and partially in the detailed design (Beach Layout section) of the design report (Beca, 2019b). We agree with the effects assessment that there are few adverse effects on the physical coastal processes within the harbour and that the proposed ongoing monitoring and management should manage any adjacent shoreline effects.

We note that there is the potential for landward movement of wind-blown sand due to the increased dry beach and the wind climate that will act on the dry beach. The "loss" of sand from the beach to landward areas can be accounted for with ongoing top-ups, but management of the reserve area need to be aware of this likelihood.

## 5 Monitoring and consent conditions

### 5.1 Monitoring

Section 5 of the design report sets out the maintenance and operation plan. In terms of survey, we recommend that areas both to the north and south of the project area (say 150m either side) are included in the survey and inspection regime and that surveys include the intertidal shelf levels to enable assessment of changes in vertical level.

## 5.2 Proposed consent conditions

We have reviewed the proposed consent conditions and have the following comments:

Consent duration: it is unclear if a 35-year term is being sought, but the stated design life is only 20 years. Providing a consent duration of 35 years could ensure that the sand and groynes are likely to be maintained for that period, but will need agreement from Port Otago that they agree to this.

Consent condition 2: We recommend RC consent 2 includes a requirement to have an average grain size of no less than 0.2mm and less than 2% fines.

Consent condition 5 and 6. This should include a requirement for the consent authority to approve the CEMP and the OMOP.

## 6 Applicability

This report has been prepared for the exclusive use of our client Otago Regional Council, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

We understand and agree that our client will submit this report as part of an application for resource consent and that Otago Regional Council as the consenting authority will use this report for the purpose of assessing that application.

We understand and agree that this report will be used by Otago Regional Council in undertaking its regulatory functions in connection with proposed Te Tauone Beach Management Scheme.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:

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Reviewed by: Peter Quilter, Coastal Engineer

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