

STAFF REPORT

TO: Environment & Planning Subcommittee - Commissioner Hearing

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REFERENCE: RM070601

SUBJECT: **SUSTAINABLE VENTURES LIMITED - REPORT EP09/07/05 -**
Report prepared for the hearing of 1 to 3 July 2009

1. INTRODUCTION

The purpose of this report is to consider the exposure of the application site to coastal hazards and make a recommendation with respect to the conditions to be included in RM070601 (Land Disturbance Consent).

2. APPLICATION BRIEF

2.1 Proposal

The application as lodged and notified sought to allow the maintenance of the existing rock revetment and to provide for its upgrade to improve stability if required. In response to submissions the application was amended, consent was no longer sought to upgrade the revetment, but to maintain and repair it and retain its existing height profile.

Location and Hydrodynamic Characteristics of the Site

The site lies within the Pakawau village on the western coastline of Golden Bay and is orientated in a NNE/SSW direction. The coastline comprises a wide flat foreshore backed by a low dune system. Some of the coast to the north of the site is protected from erosion by a mix of informal protection structures, with the balance unprotected but stabilised to a degree in some places by existing vegetation.

The entire 230 metre property frontage of the application site is protected by a disintegrating rock revetment. The revetment appears to have been in existence for some time and has almost certainly been periodically added to given the variable rock types present and degrees of weathering (Refer photograph 1).

The revetment has not been built to a specific design. The rock armour layer is variable in size and includes many oversized rocks. Some of the rocks have become isolated from the main revetment and are less effective in preventing erosion than would be the case if they were integrated into a competent structure. The revetment does not incorporate any bedding or geotextile filter layer, does not have any uniform face slope, nor is it built to any consistent height. It also contains concrete rubble and vegetation of various types is growing through the revetment.

In most locations the rock armour layer does not form a tight, interlocking matrix and the underlying base and bank material (sand and soil by appearance) is visible (Refer photographs 4 and 5). The base material is susceptible to wave erosion, which causes rock undermining and slumping, as well as upper bank failure. This is beginning to become more evident in a number of locations along the revetment.



Photograph 1: Rock protection at site

The northern end of the revetment ends with some sporadic and minor rock work on the adjacent property and terminates at the southern end with an informal concrete topped ramp made of rubble and prestressed telephone poles (Refer photograph 2).



Photograph 2: Existing boat ramp at southern end of site

There are no protection works immediately to the south of the ramp, although Coast Care dune vegetation planting has been undertaken to stabilise the low rear dune. (Refer photograph 3).



Photograph 3: Unprotected coastline to the south of the site



Photograph 4: Photograph illustrating the condition of much of the existing rock revetment



Photograph 5: Photograph illustrating the condition of much of the existing rock revetment

2.2 Zoning and Consent Requirements

The site lies within Land Disturbance Area 1 under the Tasman Resource Management Plan. The land disturbance activity, including the repair of the 230 metre rock revetment, is understood to be a restricted discretionary activity under Rule 18.5.2.5. A coastal permit to disturb and occupy the coastal marine area is not considered to be required because the toe of the revetment at present is understood to be located above mean high water springs (MHWS).

3 Notification

There were 198 submissions to the original application. The scale of the overall application was reduced in response to the concerns expressed by submitters. The amended application was sent to all the submitters for comment, and 41 further comments were received in response.

The following is a summary of the submission issues with respect to coastal hazard risk and the repair of the rock revetment:

There is a general concern with revetments per se along the foreshore and the effects of them on the amenity of the coastal environment and the hydrodynamics in the immediate vicinity.

Concern is also expressed that rock revetments are generally contrary to the Tasman District Council and community coast care work. A number of submitters state that the rock revetment is not the preferred option and it should not be repaired, but replaced with grass plantings in accordance with the coast care programme. One submitter considers that Council should impose a caveat on the applicant relieving Council of any responsibility for reconstruction and protection work for this property and the eventual property right holders of the unit titles. They state that this should not be a charge on ratepayers.

There is some concern that the surrounding properties suffer much greater erosion as a result of the presence of the revetment.

Concern is also expressed with any proposal to increase the scale of the rock revetment. It is submitted that the area is a sand dune [sic] and should be allowed to continue to function as a dune - an area where sand is deposited and removed in balance with the changing energy dynamics of the sea. It is also submitted that as sea levels rise, the intertidal zone needs to be able to move inland to maintain functional ecosystems.

This concern is reflected other lengthy submissions which express concern about any upgrade to the existing rock revetment and suggest that any upgrade would compound damage to the natural character of the coast, adversely impact on public access and would be a liability for Council. It is submitted that the reserve should be managed through the coast care programme in the same way as the existing area of esplanade reserve immediately to the south by the boat ramp with planting of spinifex and pingao. A submission to the amended application suggests three options for Council; reject the application, retain the status quo with respect to existing buildings, or impose conditions specifying the form of coastal protection works that the applicant should be required to undertake as a condition of the subdivision consent. It is suggested that a condition be imposed requiring a planned and designed Coast Care programme for the site, including removal of the existing rocks and establishment of indigenous coastal dune plants along the coastal frontage of the esplanade reserve. It is also suggested that a fall-back rock protection wall, buried within the dune could be provided for to protect the buildings and notes that this would have no adverse effect on the natural character of the coast.

The original submission from the Director-General of Conservation was neutral with respect to the application as a whole but stated that that particular regard be given to any ongoing requirement for coastal protection works that may arise as a result of increased development on this part of the coast. The submission notes that Council is required to have regard to the New Zealand Coastal Policy Statement, but acknowledges that coastal protection works have already been carried out within the property, and that much of the coastline at Pakawau has been modified to protect landward properties. However, the submission states Council should consider whether the nature, scale and location for the proposed development are appropriate, in the context of the policies in the NZCPS and TRMP and whether the proposed development would unnecessarily constrain future options to manage dynamic coastal processes at this location. They also note that if consent is granted, the coastal protection works will lie within the esplanade reserve and Council should consider who will be responsible for maintaining or upgrading the coastal protection works in the future and the effects of any such maintenance or upgrading on the public values of the reserve.

The submission seeks that the application be determined in accordance with the policies of the NZCPS and the Plan with particular regard being given to any ongoing requirement for coastal protection works that may arise as a result of the increased development on this part of the coast, the ability to restore and rehabilitate the natural character of the coastal environment and to provide for public access.

4. ASSESSMENT

The property is directly exposed to coastal erosion and seawater inundation hazard from storm wave incidence and potentially tsunami as well. Local source tsunami may generate from fault displacement in the bay or major cliff failure on shorelines adjacent to deeper water (northern Abel Tasman coastline). Distant source Pacific-generated tsunami would require significant refraction through Cook Strait into Tasman and Golden Bay. Both sources are considered unlikely to generate wave heights of more than 1-2m elevation. Tsunami risk has not been assessed per se, but is considered to be relatively modest and generally within the height envelope of storm-generated waves, but with more energy and wave run-up potential.

The investigations undertaken by OCEL Consultants in preparation of the application are interpreted and summarised as follows.

- The frequency of occurrence and duration of less than benign near shore wave conditions are significantly less than would be expected in an open coastline;
- The broad flat beach and large tide range combine to provide good protection to the coastline by encouraging early wave breaking and energy dissipation as the water shallows and by ensuring that for a large proportion of the time the breaking wave zone is seaward of the upper beach.
- While there are episodes where combinations of wave conditions, high tide, and storm surge coincide to expose the beach scarp to erosion, such combinations are relatively infrequent.

As noted in the application and OCEL report on coastal hazards, storm waves generated in Golden Bay only reach modest heights compared to open coast shorelines. Nevertheless, storm waves can and have caused persistent erosion damage on the NW coast of Golden Bay. This is evidenced by the presence of rock revetment works at Waikato to the south, along this property frontage and along parts of the shoreline to the north up to Puponga.

The OCEL report provides a very useful comparison of shoreline location (edge of vegetation) derived from several aerial photographic records dating back to 1950, as well as a 1921 cadastral boundary. The plots indicate a coastline location that is in relative equilibrium during this period, with shoreline location varying within a 10m envelope. Thus, for the most part, erosion rates on this coastline are relatively low. Revetment protection works have been required to be built more as a result of the proximity of built development and roading to the shoreline, rather than high erosion rates removing significant land buffers that may once have been present.

The OCEL report notes the physical setting of the applicant's land abutting a shallow gradient intertidal platform. In most present day circumstances, waves tend to break on the intertidal platform, expending much of their energy. This results in a relatively modest wave run-up impact on the shoreline and consequently relatively low erosion rates. These rates can vary depending on the backshore slope prevailing, quality of dune vegetation present, sediment transport balance and the nature of any protection works. In storm situations, wave run-up and impact on the dune toe increases somewhat and erosion potential along the shoreline increases. This is observable on the coast immediately south of the applicant property. Here erosion retreat has occurred and an erosion scarp has formed along the dune face. The dune comprises relatively unconsolidated and highly erodible sand, with erosion moderated to some degree by healthy dune planting through Coast Care initiatives.

Inundation risk on this shoreline at present is considered to be relatively low, due to the height of the backshore (at over 4m and up to 5-6m over much of the title) being relatively well elevated above mean sea level.

Present day erosion and inundation hazard risk will likely significantly increase on this shallow gradient shoreline as a result of climate change and potential sea level rise. The OCEL report assesses a "still water" depth of 0.98m at the toe of the rock revetment in a situation of a MHWS tide, 0.9m storm surge (as recommended by MfE) and 0.3m sea level rise. In this scenario, OCEL assess that unbroken wave heights of up to 0.76m can impact the toe of the dune.

This wave height potential, achieved when a MHWS tide coincides with a 0.9m storm surge and includes a 0.3m sea level rise, is regarded as being a very rare occurrence. However, staff do not consider that it will be as rare as indicated. While a 0.9m storm surge is a most unusual event, there are other situations (not mentioned in the report) that give rise to the same outcome. For example, a lesser storm surge height can occur on tides up to 0.5m higher than MHWS, which occur a number of times per year.

The recent MfE report "Preparing for Coastal Change – A Guide for Local Government in NZ" published in March 2009 recommends that a sea level rise of 0.5m be allowed for in 2090-2099 relative to the 1980-1999 level. It also recommends that the consequences of a 0.8m sea level rise be considered. The OCEL report allows for 0.3m sea level rise. Consequently, in the long term, the potential effects with respect to wave height impacts on the backshore are significantly understated by OCEL.

Any development proposed for the land will be present for 50-100 years. Therefore climate change impacts over this timeframe need consideration. Under a 2090-2099 climate change scenario, erosion rates and seawater inundation risk are likely to markedly increase on this shoreline, particularly if the dune face is in a vegetated state rather than protected by a rock revetment. This is given that wave generation and impacts in a "still water" depth up to 0.5m higher than assessed by OCEL may occur. This will result in a significantly higher unbroken wave being able to reach the backshore than is presently allowed for in the OCEL report. Overall, the coincidence of a high tide between MHWS and Highest Astronomical Tide level (HAT – approx 0.45- 0.5 m higher than MHWS), storm surge up to 0.9m high and a sea level rise of 0.5-0.8m, can result in much higher waves reaching the backshore than present or as forecast by OCEL.

In the extreme case, the OCEL scenario for the calculation of unbroken wave height above MHWS at the top of the beach (0.3m SLR + 0.9m storm surge) will roughly double (0.4m HAT + 0.8m SLR + 0.9m storm surge). Increased nearshore water depth will allow a significantly higher and more damaging unbroken wave to impact the backshore.

Coastal Hazard Mitigation

If consent is granted the entire dry land interface with the nearshore beach will be located within an esplanade reserve which will be vested in Council. Protection and maintenance of this interface and reserve land behind will become the responsibility of Council into the future.

Coastal erosion and inundation hazards to the proposed reserve and development behind (should consent be granted) can be mitigated to a significant degree and in a number of ways. However, in reality, the choices are limited to some form of hard engineering rock revetment structure, or through softer engineering techniques such as coastal vegetation management (Coast Care works).

i) Soft Engineering Options

It is acknowledged that rock revetments are not always the preferred method to provide coastal erosion protection and that soft engineering options are not only preferable but viable in some locations. Soft engineering options to mitigate coastal erosion are being pursued with the help of local communities in many locations in Golden Bay, including immediately to the south of this property. However, in this location some coastal land owners and Tasman District Council's predecessors have chosen to use rock revetments. In the mind of some and in the absence of a comprehensive soft engineering management policy along the entire Pakawau foreshore in the vicinity of the site, this legacy leaves little option in this location but to recommend that the existing rock revetment be repaired to a standard which will protect public access and development from existing and anticipated future coastal hazards.

Some submitters to this application advocate for soft engineering options to be utilised to mitigate coastal hazard risks. Dune revegetation works have been undertaken on the coast immediately to the south of the applicant site, with some degree of success. The shoreline north of the property consists largely of Council reserve that is in a relatively natural state, due mainly to the low incidence of historical erosion events. It has already been noted that the backshore edge of vegetation fronting this property has remained within an envelope of some 10m width over the last 60 years, indicating relative shoreline stability.

Under these circumstances, it is worth considering maintaining the proposed reserve shoreline through coast care type works. Such works would restore a more natural interface with the coast and be more visually in keeping with the northern shoreline.

Such a proposition would however, require the entire removal of the existing (unauthorised) revetment structure, involve some foreshore escarpment shaping and then complete replanting. Removal of the existing revetment works will be a significant work in its own right. To retain and bury the existing revetment is possible but not recommended, as while sand for beach replenishment may be available from some local source, very large volumes would be required to be effective and would result in the formation of a local discontinuity in beach shoreline profile. More importantly however is that at some point an erosion phase or phases will remove this replenishment and expose the rock work beneath. Once exposed, it is unlikely that the revetment would become buried and revegetated again.

As noted earlier, the region's coastlines seem to be experiencing a higher incidence of erosion events. As climate change progressively occurs, it is anticipated that increasing frequency of storms and sea level rise will increase the erosion (and inundation) hazard risk and potential on this shoreline. Thus while a soft engineering solution may have some traction and success for a number of years, perhaps decades, eventually the reserve width will diminish and result ultimately in the requirement for relocation of development behind, or hard engineering solutions to protect that development.

The reserve is contiguous with esplanade reserves to the south and marginal strips on the two adjoining properties to the north and from there north to the mouth of the Pakawau inlet via a combination of esplanade reserves (with one yet to be vested), Council and DoC land. Although there are no specific or unique features of this particular reserve that would necessarily warrant Council to consider protecting it for the use of future generations, because significant esplanade reserves exist to the north and south Council may place a higher priority on the maintenance and protection of these assets into the future and may face increasing pressure from the community to become involved.

ii) Hard Engineering Options

The most logical long term protection for the reserve shoreline and to the property to the rear would be to recognise and utilise the present revetment structure and material. However, it would require significant reconstruction of the revetment to an appropriate design. Such a design would incorporate the classic elements of rock armour bedding (generally graded rock or geotextile media beneath the armour layers), with the structure founded below potential scour depth and built with an appropriate face slope (say 2H:1V minimum) and height.

To require the building of a new revetment from scratch would involve a significant deconstruction effort to begin with and is probably unrealistic in terms of achieving the outcome required. The existing revetment has variable integrity, comprises a number of unsuitable armouring elements (including oversize rock and concrete blocks etc), has vegetation growing within and through the structure and is straddled by almost derelict beach access stairways. In its favour to some degree is that as the existing revetment has been there for some years, rock settlement into the beach will likely have reached a stable depth. Presently embedded rock can form a reasonable base for the construction of a rejuvenated structure above.

It is considered that many of the existing rock armour elements will need to be temporarily removed to facilitate the reasonable placement of smaller rock and graded bedding material wherever possible within the acceptably placed and appropriately sized existing rocks, over which a 2-layer interlocking rock armour revetment can be constructed. Two layers are considered necessary in order to prevent underlying sand material being washed out from beneath the revetment armour during wave attack, both now and increasingly into the future. A face slope of 2H:1V is desirable, to a height around RL 4.5m amsl.

OCEL have calculated that a higher revetment height is necessary to mitigate the potential effects of wave run-up on the reserve, now and certainly into the future. However, protection against this effect from RL 4.50m can be reasonably afforded by appropriate vegetation plantings which will also provide some softening to the visual impact of the structure. As much of the existing vegetation as possible should be retained at the top of the revetment, conditions have been recommended to repair and elevate the revetment which will provide medium to long term protection for both the reserve and proposed development.

The revetment needs to be effectively tied back into the existing upper beach at the northern and southern extremities of the structure, to mitigate end effect erosion occurring. This is a critical aspect of both the wall stability and shoreline stability at each end of the revetment and must be appropriately designed and constructed.

The revetment is crossed by several timber step structures, all of which are in a state of disrepair. All these structures should be removed and replaced, where desired and deemed necessary for access, with new structures constructed structurally independent of the revetment. These access structures need to be designed accordingly to be able to withstand the sea conditions experienced at the site.

Effects of Repaired and Elevated Rock Revetment on the Natural Character of the Coastal Marine Area

Although the property is fronted by an existing rock revetment and some of the coastline in the vicinity of the site is similarly protected, there is a significant amount of existing vegetation both above and growing within the structures themselves. This has the effect of significantly softening their visual impact. As already discussed, in order to protect both public access along the coastal marine area and the proposed development from coastal hazards the existing rock revetment will require some significant repair work and elevation. This will result in a visually much more dominant structure which will have a greater impact on the amenity of the coastal environment area.

The effects of this need to be considered against the policies in the New Zealand Coastal Policy Statement, Regional Policy Statement and the Tasman Resource Management Plan. The specific policies referred to in the submission state that it is a national priority for the preservation of the natural character of the coastal environment to protect the resilience of the coastal environment and to restore and rehabilitate the natural character of the coastal environment where appropriate and to

locate development in order to avoid the need for hazard protection works. The thrust of these policies is reflected in the policies in the TRMP.

In this particular situation the area of land in question is zoned for residential development and there are existing coastal protection works along some of the coastline. Although the policies in the NZCPS are acknowledged, it is considered that the appropriate option in this instance is to retain the existing revetment but require its repair be undertaken in a manner which will retain as much of the existing vegetation as possible behind the revetment and using rock which will weather in appearance over time.

5. RECOMMENDATION

If Council approves the land use and subdivision applications it is recommended that the following conditions be incorporated into RM070601 (Land disturbance consent):

1. Rock of an appropriate size shall be added to the existing structure so that all voids are filled creating an effective, interlocking 2-layer revetment armour layer overlying a graded bedding layer of minimum 200mm thickness, with a uniform face slope of 2H:1V and height of **RL 4.5 amsl**, being approximately 2.0m – 2.5m above the head of the existing sand beach. Some relocation and repositioning of existing rock shall be undertaken to make better use and advantage of isolated large rocks and to remove existing airspaces beneath and between existing rocks. The infilling shall include the creation of a uniform line of embedded toe rock material, beginning at the location of the most distant existing revetment toe rocks.
2. As much of the existing vegetation as possible shall be retained at the head of the revetment but shall otherwise be removed to allow for the revetment to be constructed to the required height. No vegetation shall be planted within the wall itself. Some replanting at the top of the wall shall be undertaken in order to enhance the visual amenity of the structure and provide bank stabilisation above the top of rock level.
3. The existing timber step structures shall be removed and replaced with structures able to withstand the sea conditions experienced at the site.
4. The design and construction of the works shall be carried out under the supervision of a chartered professional engineer with appropriate experience in coastal revetment engineering.
5. The Consent Holder shall ensure that unimpeded public access along the beach is maintained to the greatest extent practicable, with the exception of such construction times and areas where safety of the public would be endangered as a result of the works in progress.
6. The Consent Holder shall erect advice notices at both ends of the construction area. These notices shall provide warning of the construction activities noting any precautions that should be taken, as well as advising the period(s) during which these activities will be occurring and when public access shall be restricted. The notices shall be erected at least 10 working days prior to the

commencement of the works and shall remain in place for the duration of the works before being removed on completion of the works.

7. The works shall be undertaken in a manner that limits to a minor level any adverse effects of the activity on the foreshore beyond the immediate site of the works, water quality, natural beach profile, prevailing coastal processes, noise generation, and other disturbances to adjacent residents, and the reasonable continuation of public access along the beach.
8. Construction shall occur at such stages of the tide so as to not occur within, or be impacted or affected by, the ebb and flow of seawater.
9. Any vehicle movements along the foreshore shall be restricted to the smallest area practicable.
10. Vegetation and/or other waste material shall be removed from the site only to the extent necessary to facilitate the repair of the revetment. This material shall be disposed of to an approved land-based disposal site or disposed of by other approved means. The Consent Holder shall ensure that all excess soil, vegetation and other materials are removed from the site on completion of the works and that the site is left in a neat and tidy condition. No soil material or vegetation shall be left where it may enter water or result in the contamination of the coastal marine area.
11. The Consent Holder shall ensure that all fill and rock are sufficiently clean prior to placement so as to not leach contaminants into the coastal marine area.
12. The repair of the revetment shall be undertaken in a manner which results in a smooth and continuous transition that minimises end effect erosion.



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