

SUMMARY

As per Council's email dated 25th June 2008 from Greg White Manager, Natural Resources, Wyong Shire Council has requested Geofabrics Australasia Pty Ltd review and provide comments on the Directors report dated 14 May 2008.

This follows the Council resolution of 27 February 2008 that staff investigate and report on the emerging technology and use of geotextile sandbags for dune stabilisation as temporary/permanent solutions to assist in maintaining effective management of our estuary and coastal environments.

RESPONSE

194 Geotextile Bag Investigations

On receipt of the above mentioned report, Geofabrics Australasia Pty Ltd have responded to statements made in the report

1. They have been used with limited success as short term solutions in the construction of sea walls.....

Geotextile container systems have been used with great success in the past 10 -15 years. The technology was first introduced in the mid 1980's and was primarily based on long, small volume, hydraulically filled tubes, employing a trial and error design methodology. The long term performance of these initial structures was mixed, some examples are Russell Heads groyne constructed in 1993-94 using 1.2m diameter tubes which is still performing well, however Kirra Groyne constructed in 1985 using 1.2m diameter tubes failed. The lessons learnt from the initial works has lead to the development of systems which are better suited to the dynamic coastal environment. This has meant a move away from large/long tubes to smaller individual units designed to withstand the specific conditions encountered at the site. It should also be noted that geotextile manufacture and sewing technology has improved significantly since the first geotextile containers were trialed in the 1980's allowing designers to make use of the containers in longer term projects.



Russell Heads 2002

Stockton Beach in NSW was constructed in 1996 with 0.75m³ containers, with no vandal deterrent covering. The initial design requirement was for a 6-month design life.



1999



2008

Maroochy Beach emergency sea wall was constructed in 1999 using 0.75m³ containers, with no vandal deterrent covering.



1999



January 2002

Maroochy beach groynes - 4 x 100m long groynes were constructed in 2001 and 2002 using 2.5m³ containers. The vandal deterrent geotextiles were developed specifically for this project.



2002



2008

2. Council previously investigated the use of geotextile sandbags in the late 1980's and early 1990's....

The report by Patterson Britton carried out in April 1990 is no longer relevant to modern geotextile container structures.

- a. If designed and constructed correctly there is no risk of the structure becoming undermined, Geofabrics Australasia has developed scour protection systems which have proven effective on a number of projects around the country.
- b. The use of vandal deterrent geotextiles has vastly reduced the incidents of vandalism on the containers and has virtually eliminated long slices which are difficult to repair.

3. Mining of the beach sand for this purpose would be subject to Department of Environment and Climate Change (DECC) approval and is currently not supported by DECC.

We do not believe the term sand mining is correct in this application. When filling the containers with sand from the beach, sand is not being removed but rather redistributed to other areas to provide better protection and containing the sand so that it is not lost during erosion events. In-situ beach sand is utilised wherever possible (when working on the beach) as it both reduces costs and in the event containers are damaged, the sand is returned to the beach basically where it came from. Larger containers are hydraulically filled which could be from remote sand dredging operations. Installations could be co-ordinated with such operations to create significant cost savings.

4. The bags also require specialised handling and placement using modified grabs attached to large long reach excavators...

Creating similar structures in rock requires similar equipment (rock grabs/excavators). In addition, unlike sand containers, construction of rock structures significantly impact on local and arterial vehicular traffic and road infrastructure to and from the site in order to transport the rock.

5. Consequently, their use as an emergency protection measure during a storm event would not be feasible as no stable foundation could be provided in which to key the structure. In addition, wave action would constantly re-arrange the bags within the wash zone and many bags, if not all, would be lost or broken....

While we agree that construction during a storm event is not ideal we believe that a sand container structure will perform as well if not better than a rock structure constructed in similar conditions. The Maroochy beach wall was constructed under emergency conditions i.e. under wave attack which prevented the construction of what would normally be considered adequate toe protection. As a result of this a 35m section out of a total of 200m collapsed to form a rubble structure not dissimilar in appearance to a rock revetment (see photo below), it did not however result in loss or damage to the containers.

It should be noted that most of the emergency dyke repairs carried out in the aftermath of cyclone Katrina in New Orleans (and more recently during the Mississippi River floods in Clarkesville, Missouri) made use of large sand filled geotextile containers.



35m rubble section

6. Current technical specifications indicate that the retaining walls made from geotextile bags can only withstand waves of up to 1.5m.....

The size of wave which the containers can resist is dependant on the size of the container, wave period and structure layout. Until recently very little rigorous scientifically research has been carried out on the stability of geotextiles and most of the results are based on limited testing and anecdotal evidence. However recent large scale wave flume testing carried out by the Water Research Laboratory¹ has resulted in the development of current design criteria which will allow engineers to certify a geotextile container structure with confidence. An example of the results of this research is as follows:

0.75m³ container (10 sec wave period) – Hmax = 2.3m
 2.5m³ container (10 sec wave period) – Hmax = 3.2m

7. The cost of the bags is relatively inexpensive but they do require significant expertise and equipment in their use....

It is not a complicated process. This work is normally carried out by inexperienced teams and Geofabrics provides detailed training to all contractors or Council staff on the installation process free of charge. Geofabrics provides and maintains any specialised equipment requirements (be that frames/sewing machines etc), that makes for the successful, easier and more consistent installation.

8. The bags may also be used in dune rehabilitation projects where they could be stacked at right angles to the beach front.



We would agree that this application is an important role for sand containers in ongoing rehabilitation of sand dunes both in coastal and inland waters. By providing an improved beach profile and dune system, protection of assets would be achieved at an early stage and at an inexpensive cost compared to remedial structures based on longer term damage.



¹ A draft report on this testing is currently be