

## **DEFENDING DURBAN'S BEACHES**

### **Introduction**

The stunning Durban promenade stretches from the Port's northern breakwater to the mouth of the Umgeni River. It provides kilometres of uninterrupted, breathtaking sea views, restaurants and many other amenities.

Over the past few years the Durban coastline was affected by severe storms. The storms destabilized the coast and caused significant coastal erosion and unprecedented damage to coastal property. Consequently coastal erosion will continue until a new equilibrium can be established.



*Aerial View of the Durban Promenade*

### **Project Description**

eThekweni Municipality had to come up with a solution to protect the promenade, in the event of a similar storm experienced in March 2007, where the beach was depleted and a second line of defence needed.

The Durban Port Authority frequently dredges the harbour mouth and together with eThekweni uses this sand to replenish the beaches. However the sand that is pumped onto the beach is eventually lost to the sea as the currents move the material up along the coast and back off shore. This second line of defence was to create a seawall using Kaytech's EnviroRock™ geocontainers. These bags provide a temporary holding measure until such time the sand is dredged and pumped back onto the beach and the natural beach profile re-established.



*Placing of EnviroRock™ geocontainers*

## **Design Methodology**

Marco Pauselli of GAP Consulting was appointed to design the protection for the promenade. The protection was based on a two-fold approach namely; ongoing beach nourishment and protection by large sand bags.

Kaytech's geocontainers have proved integral in work on repairing the beaches after the March 2007 storms in KZN. In addition, they have proved their effectiveness in two major groynes constructed to help restore Langebaan's beaches after severe storm damage. These measures have been successful further afield in Australia and in many other parts of the world.

A further benefit is that these solutions fit hand in glove with the Department of Environmental Affairs' requirement for "soft solutions" wherever possible.

The design detailed the use of 3.5 ton to 4 ton geocontainers. The wall was constructed using a double layer of these containers (i.e. one bag behind the other) for the full height of the protection at a slope of 1:1. In addition, provision was made for a flexible front toe that protrudes out from the main structure, commonly referred to as a "Dutch toe" or "self healing toe" for scour mitigation.



*Double layer EnviroRock™ Wall*

The financial constraints of the client had to be considered, therefore, the area immediately in front and some distance either side of buildings was protected with a double layer of geotextiles whilst the remainder of the promenade was protected with a single layer and a two meter high RockGrid® PC 100/100 geogrid wrap around wall.



*Single Layer of EnviroRock™ with RockGrid® PC wrap around wall*

## Products Used

The geogrid referred to is a high tensile strength composite polyester grid combined with a lightweight needlepunched nonwoven polyester geotextile that provides excellent reinforcing characteristics and ensures minimum deformation in the structure. As a composite reinforcing grid, the geotextile component provides sufficient drainage capacity within its plane, i.e. transmissivity, enabling it to reduce pore pressure build-up in the reinforced soil, thereby improving the internal shear resistance and overall stability of the structure.

EnviroRock<sup>®</sup> geocontainers are specifically designed for the projects where they are used, and manufactured from a robust, durable nonwoven staple-fibre polypropylene material which is UV stabilized and abrasion resistant making it well suited to coastal erosion control applications. The systems, designed with input from Kaytech, are effective, and an aesthetic solution that assimilates well into the environment.



*Installed Section of EnviroRock™ Wall*

## Conclusion

Research presented in recently published conference papers has shown that correctly-designed measures of this type are most stable against wave attack.

The research conducted by Kaytech and its technology partners has resulted in an excellent suite of geocontainer solutions that have proven to be effective in beach erosion

protection. The use of these materials has protected the integrity and beauty of our shoreline, and the stunning beaches along the Durban Promenade are shining examples.