

BOSCASTLE FLOOD DEFENCES BOSCASTLE, CORNWALL, UK

EROSION PROTECTION

Product: MacMat® R & Reno Mattresses

Problem

Engineers Halcrow Group Ltd was set a difficult challenge by their client, The Environment Agency. This was the provision of robust flood protection measures for the pretty village of Boscastle, without affecting the soft, rural aspect of an area of Outstanding Natural Beauty. The village had already made national news in 2004, during extreme and extensive flooding, which now required mitigation.

Halcrow Design Manager Chris Green, put the challenge into perspective. "With anticipated water velocities of up to 5.0m/second for significant storm durations, a soft engineered solution was simply not viable. In flood conditions, the river can bring down trees and large boulders which would destroy conventional embankment protection or erosion control blankets which rely upon vegetation for their performance.

To give the village protection against extreme conditions but without affecting the rural aspect, we needed a solution that gave us a soft, river-bank appearance but with a robust, hard-engineered core," added Green.

Halcrow knew that during storm events, the performance of erosion control systems deteriorates and that vegetation cannot be relied upon to provide long-term erosion protection. Halcrow therefore, with the assistance of Maccaferri, designed a system that would offer the required erosion protection for the entire design storm duration, with or without vegetation. Under long storm durations, vegetation is ripped out from erosion protection systems, leaving the erosion protection alone.

Solution

To achieve this solution, Halcrow specified a combination of Reno Mattresses and MacMat-R from Maccaferri.

Over 7000 sq metres of Maccaferri wire mesh, "Reno Mattress" units and MacMat-R reinforced geomats are being used to reinforce and protect a vulnerable embankment between the River Valency and a newly raised and extended car park close to the village. The car park will effectively form a wide, sacrificial flood plain, should extreme conditions similar to those of August 16th 2004 be repeated.

Reno Mattresses are large flat wire cages, similar to gabions, 6m x 2m x 0.23m, lined with Bidim filter fabric and filled with site won fill material.

Client:

THE ENVIRONMENT AGENCY

Main contractor:

CARILLION

Designer:

HALCROW GROUP LTD

Products used:

RENO MATTRESSES, MACMAT-R

Date of construction

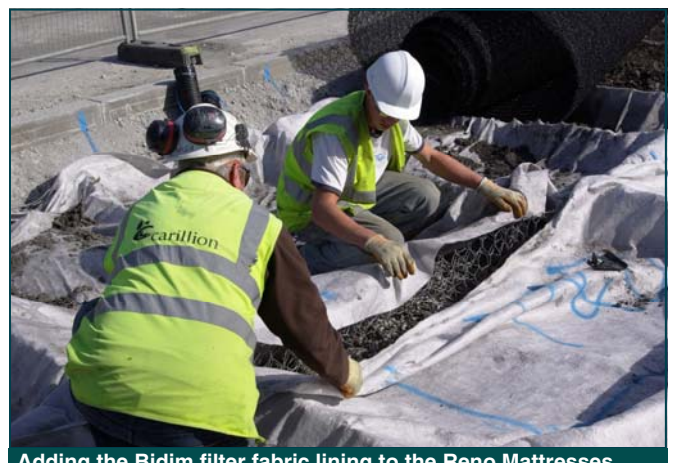
OCTOBER 2006 – MARCH 2007



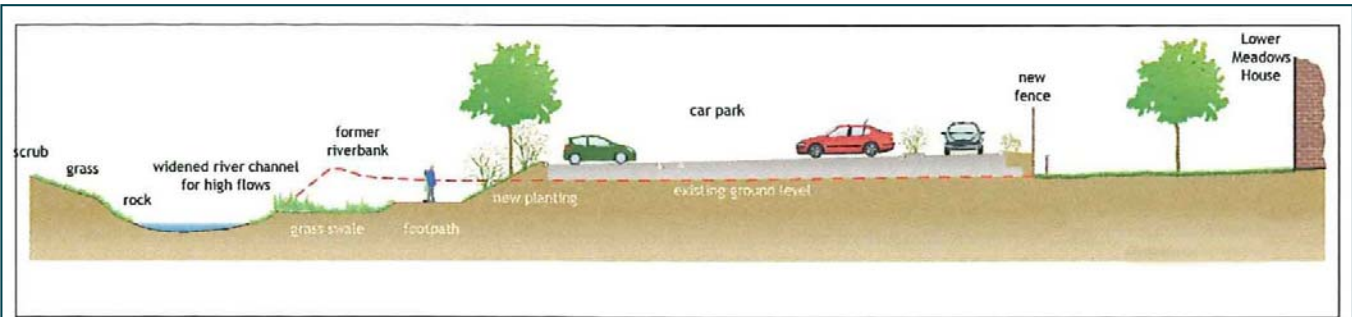
Dramatic floods in Boscastle, August 2004



Construction of the Reno Mattresses



Adding the Bidim filter fabric lining to the Reno Mattresses



The Reno mattresses were used beneath the grass swale and footpath

For the Boscastle project, the Reno units were also capped with MacMat-R, a three dimensional geomat made of polypropylene monofilaments with an integrated double twist wire mesh reinforcement. Without reinforcement, traditional erosion control mats would be destroyed in the 5m/sec, long term anticipated flow rates.

Some erosion control mats can accommodate 5m/s flows, but only when fully vegetated, and even then only for short term durations. Boscastle needed long term reliable protection.

A continuous array of these units was installed along a 200m long, 2-stage embankment adjacent to the car park. At its upstream end, the embankment is approximately 10.0m wide. At its downstream end, it narrows to 3.5m wide with a 30 degree slope. The level of the car park itself was raised by 1.0m, mainly using materials excavated from the widening of the river channel.

At the river-side foot of the embankment, a cast in-situ concrete toe rail was placed to provide additional protection. At the head of the slope, a row of heavy section timber bollards were set into concrete footings. Combined, this creates a hard, durable embankment protection system capable of withstanding extreme flow velocities and impact from water-borne debris.

On completion, the embankment is covered with a 150mm layer of topsoil to encourage vegetative growth. Holes cut in the MacMat-R at intervals, allow the planting of trees to enhance the river-bank appearance.

Colin Mitchell, Project Manager for contractors, Carillion Regional Civil Engineering, was full of praise for the Maccaferri systems. "It was the only sensible engineering solution for the water velocities and storm durations involved. A case of the right products for the job."

Work commenced on the £4.2m Boscastle flood defence project in October 2006 with engineering work being undertaken in two autumn-to-spring phases, so as not to disrupt the summertime holiday seasons.



Filling the Reno Mattresses with site won material



MacMat-R lids, prior to being covered in top soil

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