

DEFENDER LANE MASS MOVEMENT REMEDIATION CHRISTCHURCH, CANTERBURY, NEW ZEALAND

Rockfall Embankments

Problem

The 2010 Canterbury and 2011 Christchurch Earthquake has caused many hill slopes to become unstable and a danger to public. CCC contracted GNS Science to assess and identify high risk areas that requires immediate rectification attention.

The road Defender Lane is located in the Redcliffs suburb, approximately 10km away from Christchurch City. It sits on top of a slope and there are a few houses located at the foothill. After the 2011 earthquake, significant localized cracking was formed on the slope. The amount of slope displacement coupled with steep slope angles, suggested that there is risk of debris flow impacting the foothill houses.

CCC has appointed Stronger Christchurch Infrastructure Rebuild Team (SCRIT) to undertake the remediation works. URS was tasked to undertake the design of a debris flow protection structure at the foothill. The debris volume was estimated to be 700 - 1,000 cubic meters and debris impact velocity was assumed to be 5.0m/s.

Solution

The green terramesh (GTM) embankment was the chosen solution because of the long term durability of the structure, ability to withstand multiple impacts without the need for major repair and ease of maintenance.

Maccaferri assisted in providing the internal stability analysis of the GTM embankment using Maccaferri internal software MacStars. The analysis is modeled with dynamic pressure of 94kPa acting against the uphill side, upper portion of the embankment to simulate the impacting debris flow scenario. At the uphill side, lower portion of the GTM embankment, it is assumed that static load acts on to it to simulate the accumulation of debris flow material upon impact.

The GTM embankment construction took the 6-man team approximately 10 weeks to complete. This included the backfilling and compaction of the 1(V):2(H) slope batter on the downhill side along with other drainage and landscape works.

Client: Christchurch City Council (CCC)

Designer / Consultant: URS NZ Ltd (aka Aecom NZ Ltd)

Contractor: SCIRT

Products used (Qty.)

- Green Terramesh

L: 80m; H:4.0m

Date of construction: 01/2015 - 06/2015



GTM embankment: Installation of GTM cage in progress



GTM embankment: Installation of GTM cage in progress



GTM embankment: Construction completed



GTM embankment: Construction completed & vegetation growing on GTM face