

Case Study

application	Basal Reinforced Embankments
location	New South Wales, Australia
product	Mirafi® PET200, PET800, & PP25

TenCate™ develops and produces materials that function to increase performance, reduce costs and deliver measurable results by working with our customers to provide advanced solutions.

THE CHALLENGE

The Pacific Highway in Australia has undergone major upgrading between Sydney and Brisbane to turn it into a dual carriageway freeway. The construction between Yelgun and Chinderah in the North of New South Wales consists of a dual carriageway freeway of some 30 km in length.

THE DESIGN

Approximately 10 km of this freeway were to be constructed in geologically old river valleys and flood plains where the foundation soils consisted of soft silty clays, with depths ranging from 5 to 15 m. The undrained shear strength of this soft silty clay layer ranged from 8 to 12 kPa, with a 1 m thick overconsolidated crust of approximately 25 kPa. Along

these parts the required highway embankment heights ranged from 2 to 5 m. The embankment geometry consists of a 30 m wide crest with 2:1 side slopes.

THE CONSTRUCTION

A geotextile separator was placed directly on the soft foundation. Prior to its placement, trees and large vegetation was removed, but the grass was left in place in order not to disturb the surface of the soft foundation layer. Mirafi® PP25 woven tape geotextile separator was rolled out directly over the left-in-place vegetation. Geotextile overlaps of 0.5 m were used in order to provide continuous geotextile separation coverage prior to placement of the bridging layer on top.

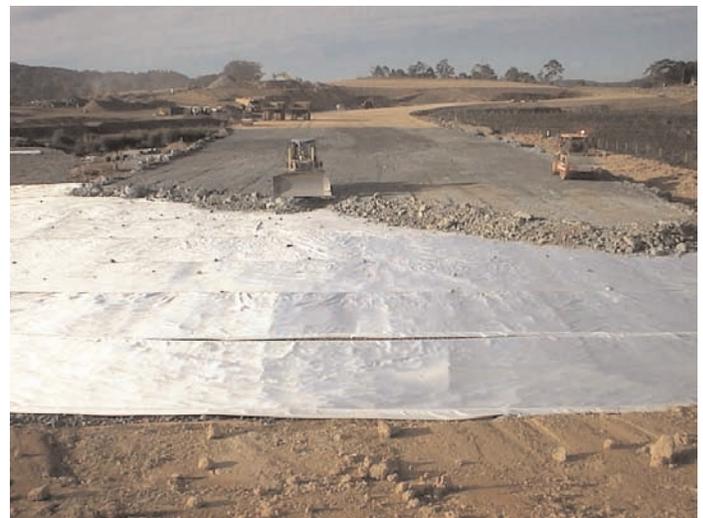
A bridging layer, consisting of 0.5 m thick of clayey material was constructed on top of the separation geotextile. This bridging layer, which was obtained from the local earthworks, created a stable platform on which the prefabricated Vertical Drain (PVD) installation equipment

could operate. To accelerate the rate of consolidation of the soft foundation soils PVD's were installed on a square grid with spacings ranging from 1 to 3 m. Once the PVD's were installed a 0.2 m thick drainage layer of crushed gravel was placed on top of the bridging layer. The drainage layer enabled the excess pore water from the PVD's to be drained rapidly to the extremities of the embankment.

Mirafi® woven polyester (PET) geotextiles were placed across the top of the drainage layer to provide basal reinforcement stability for the embankments. Mirafi® basal reinforcement layer provide short term stability for the embankments to enable them to be constructed to the required design height, and then maintain stability, until the soft foundation has consolidated and can support the embankment loading itself. Depending on the height of the embankment sections and the depth and strength of the soft foundation soils different Mirafi® woven polyester strengths of 200 kN/m, 400 kN/m, 600 kN/m and 800 kN/m were



Mirafi® woven polyester was placed on top of the drainage layer to provide reinforcement stability for the embankments.



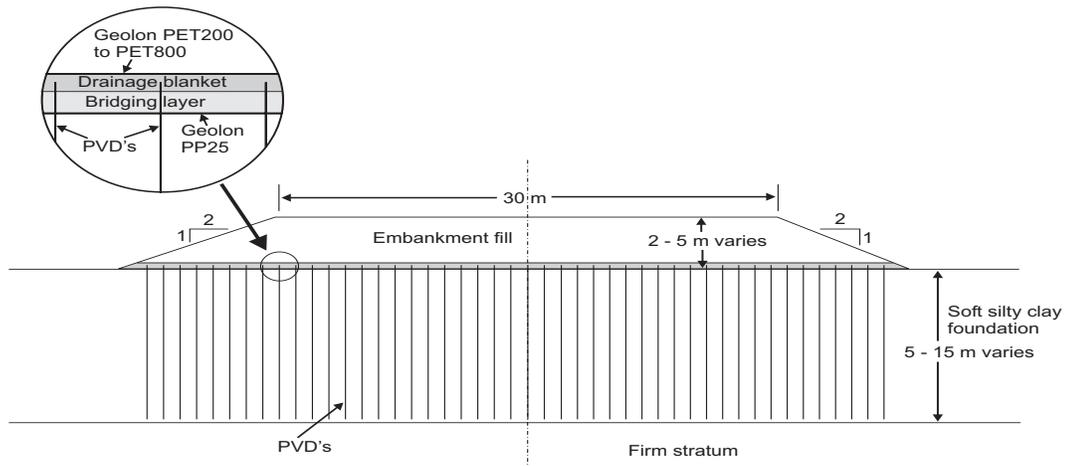
The woven polyester geotextiles were installed crossways across the width to ensure continuous length of reinforcement across the embankment sections.

used. Mirafi® woven polyester geotextiles were installed cross-ways across the width of the embankments to ensure a continuous length of basal reinforcement spanned across the width of the embankment sections. Along the length of the embankments Mirafi® woven polyester geotextiles were overlapped by a minimum of 0.5 m.

The embankment fill was then placed on top of the woven polyester basal reinforcement. The fill used was variable, ranging from overconsolidated clay to crushed rock, and was obtained from cut sections along the length of the free-way. To increase the rate of consolidation a surcharge of 1 to 2 m of fill was placed on top of the embankment. This surcharge, in combination with the PVD's, enabled most of the embankment settlement to occur during the period of construction.

THE PERFORMANCE

After 6 to 9 months the excess surcharge was stripped off the top of the embankments and the surface was graded and prepared for the placement of the highway pavement. Once the pavement had been constructed and the ancillary structures completed the highway was opened to traffic.



Yelgun to Chinderah Reinforced Embankments

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