

# TenCate Mirafi® PET Pacific Freeway, Chinderah NSW



The Pacific Highway in Australia has undergone major upgrading between Sydney and Brisbane to turn it into a dual-carriage 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.

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, increasing with depth, with a 1 m thick overconsolidated crust of approximately 15 kPa. Embankment heights in these areas ranged from 2 to 5 m. The embankment geometry consists of a 30 m wide crest with 1V:2H side slopes.

To meet the construction time and performance requirements of the project it was decided to construct a basal reinforced, 1 m surcharged embankment in the areas where soft foundation soils were encountered. The basal reinforcement would provide adequate stability to allow the embankment to be constructed quickly to the full height, with the 1V:2H side slopes, and thus ensure the maximum time for foundation consolidation during

the construction period. Foundation consolidation was accelerated by the installation of prefabricated vertical drains (PVD's) into the soft foundation layer.

A Mirafi® 500X geotextile separator was placed directly over the grass vegetation on the soft foundation soil. Prior to its placement, trees and large vegetation were removed, but the grass was left in place in order not to disturb the surface of the soft foundation layer. The geotextile was overlapped 0.5 m to provide continuous geotextile separation coverage prior to placement of the bridging layer on top.

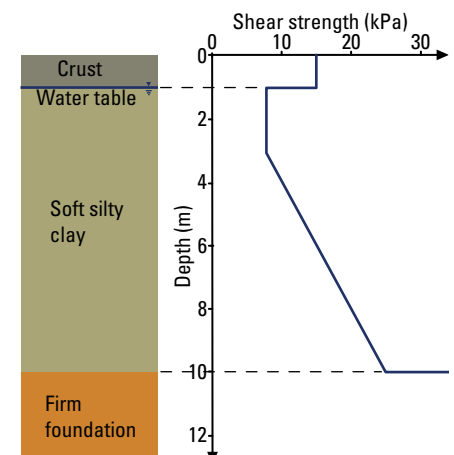
A bridging layer of 0.5 m thick of local clayey fill was placed on the separation geotextile. This bridging layer created a stable platform on which the PVD installation equipment could operate, and also enabled less granular material to be used for the drainage blanket. Following this, a 0.2 m thick drainage layer of crushed gravel was placed on the bridging layer. The gravel was obtained from crushing rock in cut sections of the freeway project. The drainage layer enabled the excess pore water from the PVD's to be drained rapidly to the extremities of the embankment. The PVD's were then installed through the drainage and bridging layers into the soft foundation

on a square grid with spacings ranging from 1 to 3 m.

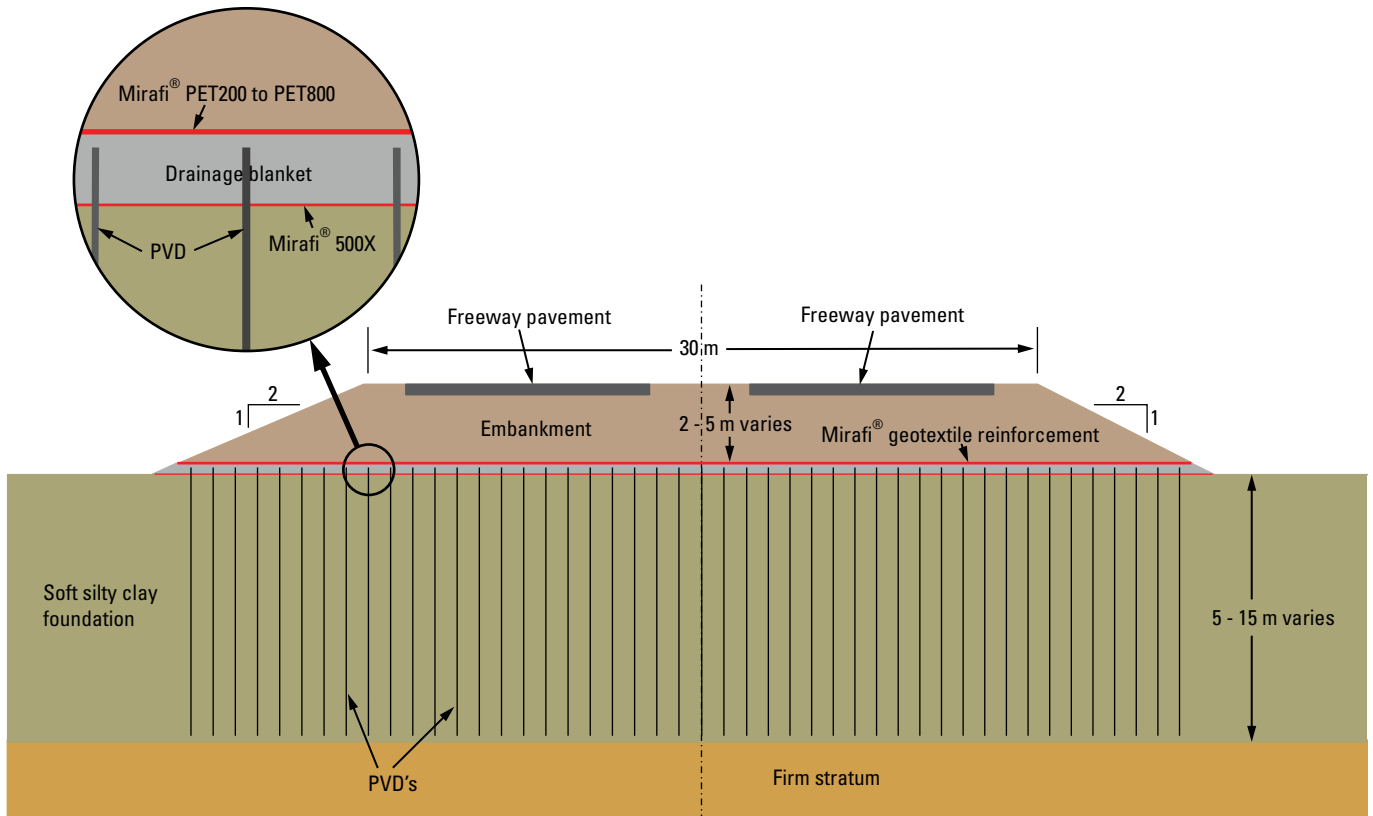
Mirafi® PET woven polyester geotextiles were placed across the top of the drainage layer to provide the basal reinforcement stability for the embankments. Depending on the height of the embankment sections,



Ground conditions at site



Foundation shear strength profile



**Cross section through the basal reinforced embankments**

and the depth and strength of the soft foundation soils, different Mirafi® PET strengths of 200 kN/m, 400 kN/m, 600 kN/m and 800 kN/m were used. The Mirafi® PET geotextiles were installed 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 the Mirafi® PET geotextile was overlapped by a minimum of 0.5 m.

The embankment fill was then placed on top of the Mirafi® PET 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 freeway. To increase the rate of consolidation a surcharge of 1 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.

After 9 to 12 months the excess surcharge was stripped off the top of the embankments and the surface was graded and prepared for the placement of the freeway pavement. Once the concrete pavement had been constructed and the ancillary structures



**Placement of PVD's through gravel drainage layer**



**Embankment under construction**



**Placing Mirafi® PET geotextile reinforcement over drainage layer**



**Completed freeway**

completed the freeway was opened to traffic.

**Client:** Roads and Traffic Authority, New South Wales, Australia.

**Consultant:** SMEC Pty Ltd, New South Wales, Australia.

**Contractor:** AbiGroup Ltd, New South Wales, Australia.