

# Mirafi® PET embankment basal reinforcement Yelgun to Chinderah Freeway, NSW, Australia

## Project Data

<b>Project</b>	: Basal Reinforcement Embankment at Yelgun to Chinderah Freeway, Australia
<b>Products Used</b>	: Mirafi® PET & Mirafi® 500X geotextiles

## Overview

The use of high tenacity polyester (PET) geotextiles to reinforce embankment structures over soft unstable subgrades is a common construction technique. This project describes the typical use of such materials.

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

Approximately 10km of this freeway was to be constructed in geologically old river valleys and floor plains where the foundation soils comprised silty clays ranging from 5 to 15m in depth. The undrained shear strength of the clay ranged from 8 to 12 kPa, with a 1m thick over-consolidated crust of approximately 25 kPa. Along these parts the highway embankment heights ranged from 2 to 5m with a geometry consisting of a 30m wide crest with 2:1 side slopes.

## Construction sequence

A geotextile separator comprising Mirafi® 500X woven polypropylene geotextile was installed directly over the left-in-place vegetation. Geotextile overlaps of 500mm were used in order to provide continuous geotextile separation coverage prior to placement of the bridging layer on top.

A bridging layer, consisting of 500mm thick of clayey material was constructed on top of the

separation geotextile. This bridging layer, created a stable platform on which the Prefabricated Vertical Drain (PVD) installation equipment could operate. Once the PVD's were installed a 200mm thick crushed gravel drainage layer was placed on top to the bridging layer to facilitate the rapid release of pore water expelled from the PVD's to the extremities of the embankment.

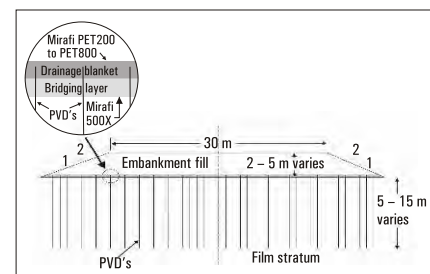
To ensure basal reinforcement stability of the high embankment structures, Mirafi PET high tenacity reinforcement geotextiles were placed across the top of the drainage layer. The function of the Mirafi® PET reinforcement geotextile was to provide short term stability for the embankments and enable them to be rapidly constructed to the required design height, and then maintain stability until the soft foundation consolidated.

Depending on the height of the embankment sections and the depth and strength of the soft foundation soils various grades of Mirafi® PET geotextiles with strengths between 200kN/m, 400kN/m, 600kN/m and 800kN/m were used.

The Mirafi® PET geotextiles were installed cross-ways across the width of the embankments to ensure continuous reinforcement across the full width of the embankment. The embankment fill was then placed on top of the Mirafi® PET basal reinforcement. To increase the rate of consolidation an additional surcharge layer of 1m to 2m of fill was placed on top of the final embankment. The surcharge, in combination with the PVD's, ensured most of the embankment settlement to occur during the period of construction.

After 6 to 9 months of consolidation the excess surcharge was stripped off the top of the embankments and the surface was graded and prepared for laying the pavement layers.

Finally, once the pavement layers and ancillary structures were completed the highway was opened to traffic.



Cross section of basal reinforced embankment



Installation of the high tenacity Mirafi® PET geotextile

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