



KAYTECH CASE STUDY

SUBGRADE STABILISATION FOR HIGH FILL EMBANKMENTS ON THE N2 WILD COAST HIGHWAY

GEOSYNTHETICS USED

RockGrid® PC: A composite geogrid combining structural reinforcement and integrated drainage capabilities. It distributes loads across the embankment, reduces settlement, enhances slope stability, and facilitates water movement to prevent pore pressure build-up in high-fill, steep terrain applications.



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PROJECT DESCRIPTION

The N2 Wild Coast Highway Section 20 forms part of the 410km corridor connecting East London and Port Edward. This 17.3km greenfields section between the Mtentu and Msikaba bridges traverses steep, mountainous terrain requiring several high-fill embankments.

Geotechnical investigations identified variable foundation soils, including loose sandy colluvium, residual sandstone and deeper clayey silt horizons. These materials posed a risk of localised deformation, differential settlement and reduced embankment stability. A conventional approach would have required excavation and replacement with selected G9-quality material; however, limited borrow sources, environmental constraints and the scale of excavation made this impractical.

A BETTER SOLUTION

Kaytech addressed this by proposing RockGrid® PC 100/100 composite geogrid at the interface between the prepared in-situ foundation and the embankment fill. The grid component provides tensile reinforcement and helps distribute loads across the variable foundation, while the attached geotextile provides separation to prevent contamination of the imported fill by finer subgrade soils. This combined reinforcement and separation function improved embankment performance while reducing the need for extensive excavation and replacement.

Slope stability was assessed using finite element analysis with the Shear Strength Reduction method to determine the Factor of Safety for both the conventional cut-and-replace and reinforced options. Drained triaxial test results were used to confirm the shear strength parameters adopted in the model. The reinforced solution achieved the required stability while avoiding the removal and replacement of approximately 1.2m of unsuitable foundation material.

The reinforced embankment design improved global stability by distributing embankment loads across the variable foundation soils and mobilising tensile resistance within the RockGrid® PC reinforcement layer. This limited deformation and differential settlement without relying on undercutting and replacement. By retaining more of the in-situ foundation material, the solution reduced excavation volumes, imported fill requirements, haulage, construction time and environmental disturbance, providing a practical and technically sound alternative to conventional cut-and-replace treatment for the high-fill embankment areas.



RockGrid® PC laid over the prepared subgrade.



Fill material placed atop RockGrid® PC.



Completed embankment reinforced with RockGrid® PC.

Did you know?



Slope Stability

Using a single layer of RockGrid® PC reduced embankment settlements and improved overall slope stability without removing 1.2m of material.



Cost & Environmental Impact

The solution eliminated the need to import large volumes of rockfill, reducing project costs and environmental impact.



Validated Performance

Drained triaxial testing verified the soil shear strength parameters used in the stability assessment, confirming that the RockGrid® PC reinforced design achieved the required Factor of Safety for long-term embankment performance.