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.

CONTACT

Julian Maastrecht

083 265 7089

julianm@kaytech.co.za

www.kaytech.co.za

35 Manchester Road,
Chiselhurst, East London

PROJECT DESCRIPTION

The N2 Wild Coast Highway Section 20 forms part of a 410 km corridor connecting East London and Port Edward. This 17.3 km greenfields section between the Mtentu and Msikaba bridges crosses steep, mountainous terrain requiring several high fill embankments. Subsurface investigations revealed loose sandy colluvium and residual sandstone extending beyond 1.2 m, underlain by deeper clayey silt deposits. Under conventional specifications, these materials would typically require excavation and replacement with higher quality G9 material. However, limited borrow sources, strict environmental constraints on spoil disposal, and the scale of excavation posed significant logistical and environmental challenges.

A BETTER SOLUTION

Kaytech proposed a geosynthetic reinforcement approach to improve embankment performance while avoiding extensive excavation. The design incorporated RockGrid® PC 100/100 composite geogrid installed at the interface between the in-situ soils and the embankment fill. The reinforcement layer distributes loads more effectively and mobilises tensile resistance within the geogrid structure, improving stability and reducing differential settlement in the underlying soils.

A slope stability assessment was conducted using RS2 finite element modelling software from Rocscience. The analysis applied the Shear Strength Reduction technique to determine the Factor of Safety for several design scenarios, including the conventional cut-and-replace option and the reinforced alternative. Laboratory drained triaxial tests were undertaken to verify the cohesion and friction parameters used in the modelling. Results confirmed that the reinforced design met stability requirements while eliminating the need to remove approximately 1.2 m of unsuitable material beneath the embankments.

The reinforced embankment design improved global slope stability while reducing settlement risks associated with the weak foundation soils. By eliminating large-scale excavation and replacement of subgrade material, the solution reduced construction time, material haulage, and environmental disturbance. Following laboratory verification and detailed engineering assessment, the reinforced design was accepted by the consulting engineers for implementation.

RockGrid® PC laid over the prepared subgrade

Fill material placed atop RockGrid® PC to form the embankment

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 1.2 m of material.

Cost & Environmental Impact

The solution eliminated the need to import large volumes of G9 rockfill, reducing project costs and environmental impact.

Validated Performance

Triaxial testing confirmed the in-situ soil properties, ensuring the RockGrid® PC interface met the required Factor of Safety and long-term embankment performance.