



## PROJECT AT A GLANCE

### Application

Steep slope protection

### Subgrade/Soil

Silty clay with weak sandstone

### Region

Europe

### Installation

2008

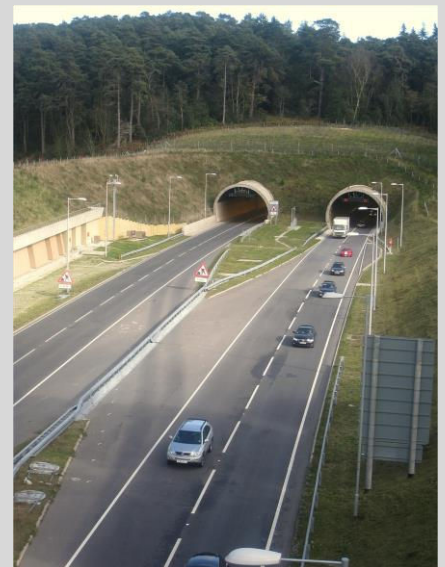


## Vegetated Steep Slope Protection with Soil Nailing on Tunnel Slopes

Slopes surrounding tunnel portals are often an engineering challenge – unstable, steep, and high. Neoloy® Tough Cells were chosen as they provide a long term robust and durable surfacing to be used with the soil nailed slopes.

The construction of a tunnel on a major highway created unnaturally steep slopes between at 45-80° inclination in restricted locations with challenging geometric shapes. Slope heights – varying from 14-21 meters – required permanent erosion control with a vegetated cover. The client's goal was to ensure that the tunnel portals were aesthetically pleasing and blended with the surrounding landscape. The solution also had to be cost-effective as well as durable to minimize maintenance.

The proposed solution was for a composite slope stabilization method. First soil nailing (6-10m deep) was installed into the cut slopes, and then covered with steel mesh, which reinforced the unstable cut slopes between the nail heads. The Neoloy Tough Cell slope protection was then used to contain topsoil and create a green, vegetated landscape surface with high environmental value. At the North portal with the steepest slopes, Neoloy Tough Cells were filled with shotcrete for a strong, safe and stable surface cover.



## ABOUT PRS

PRS Geo Technologies ([www.prs-med.com](http://www.prs-med.com)) is a global engineering, manufacturing and technology company providing the unique Neoloy Tough Cell 3D mechanical soil stabilization technology. Since its establishment in 1996, PRS and its partners worldwide have implemented thousands of successful projects in over 80 countries.





## LOAD SUPPORT

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Photo Source: A.D., Mott MacDonald



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### CONVENTIONAL SOLUTIONS

Traditional shotcrete surface cover solutions over the soil nailing/mesh were considered by both the client and consultant as environmentally inappropriate, expensive, and ensued a longer construction timescale. Shotcrete surface finish is unattractive and does not fit the environmental sensitivity and landscape aesthetic of the site. Other solutions for green surface covers at this site were determined to be ineffective.

### NEOLOY SOLUTION

The geotechnical slope design specified large-cell Neoloy Tough Cells over the soil nailed slopes. The Neoloy mattress was anchored on the slope, infilled with topsoil and hydroseeded to establish natural land cover.

The high tensile strength and long-term creep resistance of Neoloy Tough Cells is critical to the withstand the high stresses at this extreme inclination. The engineered perforation pattern in the cell walls provides excellent drainage while retaining the soil and enabling soil-root interlock. Neoloy Tough Cells afford effective mechanical protection for both the soil and the vegetation from rain, runoff and downhill erosive forces.

On the North portal's extreme slope angles above the portals, Neoloy Tough Cells were filled with shotcrete to create a near vertical hard armor surface. Neoloy Tough Cells added tensile strength and flexibility to tolerate minor ground movements/vibration from the tunnel, thereby improving surface cover durability and lifespan.

### CLIENT BENEFITS OF NEOLOY TOUGH CELLS

- **Environmental Protection** - aesthetic green solution.
- **Mechanical Protection** - effective, durable protection for slope and vegetation from erosive forces.
- **Highway/Property Protection** - soil veneer stabilisation from soil-root interlock.
- **Fast Installation** - simple logistics, compact folded sections opened onsite.
- **+30% cost savings** - due to rapid installation and efficient logistics.

EN-CS-SC-1106G



ISO- 9001  
ISO-14001  
ISO-18001

