

# GEOWEB®

## BALLAST REINFORCEMENT SYSTEM

### PROJECT TEAM

**Owner:**  
Borders Railway

**Contractor:**  
BAM Nuttall Limited

**Material Supplier:**  
Greenfix UK



### BORDERS RAILWAY

Galashiels, Scotland



GEOWEB 3D Confinement system is effective even with salvaged ballast material.

**Geosynthetics combine to create stiffened trackbed; increase critical velocity of track in soft soil area.**

### Project Background

The Borders Railway is the longest new domestic railway to be constructed in Britain for over 100 years. Four new stations built in Midlothian and three in the Scottish Borders have reduced journey times between Tweedbank and Edinburgh to less than one hour from the previous nearly two and a half hours.

The area approaching the new Galashiels station at Fountainhall was found to have particularly wet and marshy peat ground requiring additional stabilization beyond the conventional geosynthetics routinely used in trackbed construction. The GEOWEB 3D confinement system, successfully employed in the rail industry for over 30 years for challenging soil stability problems, was chosen to stabilize this area of track. The GEOWEB material carries Network Rail approval for track drainage with PADS numbers covering 100mm, 150mm, and 200mm (4 in, 6 in and 8 in) depths.

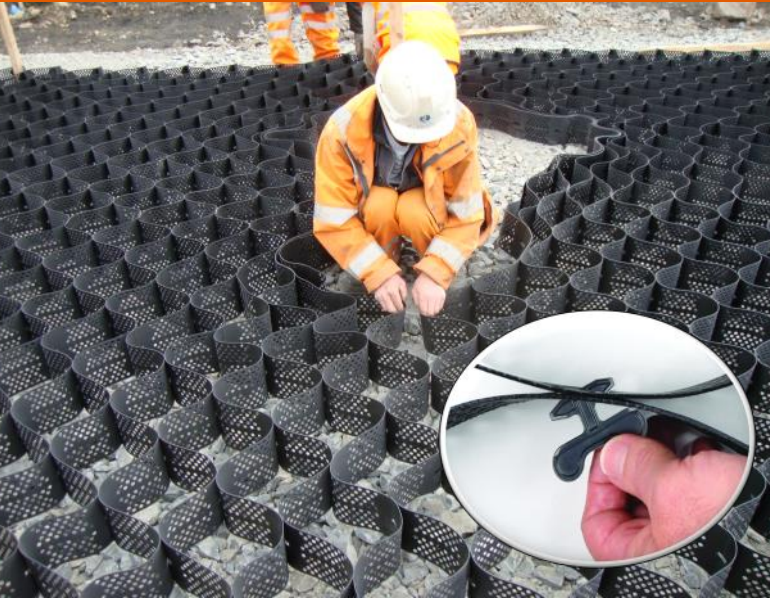


Geotextile & geogrid layers installed prior to GEOWEB 3D aggregate confinement.



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### Evaluating a Solution

**Product Selection:** Greenfix UK worked with main contractor BAM Nuttall Limited, a construction and civil engineering resource for the rail industry, to establish the most appropriate grade and depth of the GEOWEB® 3D system to perform with the exceptionally soft ground conditions. *The GEOWEB system's ability to perform in soft subgrades and suitability for this application was supported by test results from the Transportation Technology Center in Colorado.*

### Design Phase:

Design work was performed by Greenfix UK in conjunction with local track engineers. The use of the GEOWEB 3D system would create a stiffened ballast layer and reduce ballast depth requirements at least 50%. Two layers of 150 mm (6 in) GEOWEB material were selected as the most suitable depth for this challenging site.



### Installation of the Ballast Reinforcement System

**Ballast Strengthening Layers:** A geotextile separation layer and geogrid reinforcement layer were laid over the prepared aggregate base, followed by another layer of aggregate. Next, GEOWEB panels were expanded and positioned two panels high and two panels wide across the trackbed to cover a width of 5.2 meters (17 feet).



### Efficient Construction:

GEOWEB sections were installed end-to-end and side-to-side with 'turn and lock' ATRA® keys. The connection keys are fast and easy to install—and assure a secure connection at each GEOWEB joint for optimal performance.

ATRA Keys are also permanent connections—3X stronger and faster to install than stapling, and safer. Made from corrosion-resistant polymer, ATRA keys will not degrade over time.

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### About Greenfix UK

Greenfix UK's technical staff provided technical support to the designers and client as required and were onsite to train and advise the contractors responsible for the installation.

Project information and material supplied by GREENFIX UK