Secumat® - Railway line Groenekan - The Netherlands

Erosion control on railway slopes

- **Project Name**
  Railway line Groenekan, Utrecht, The Netherlands
- **Project owner**
  Prorail, Utrecht, NL
- **Main contractor**
  Molhoek-CCT B.V., Utrecht, NL
- **Site supervision**
  IV Infra, Papendrecht, NL
- **Product**
  Secumat® 401 20/20 Q1
  Secumat® PinU 23

Challenge

Railway slopes are part of a vital and sustainable infrastructure. To make this infrastructure climate safe, it is necessary to take action: protect embankments from surface-parallel erosion, to integrate habitats in a way that they are accepted by animals and plants – while at the same time, the protection system continues to function. Therefore, building a resistant erosion control system for rising weather phenomena with a long duration is essential.

At the location of Groenekan (Utrecht, The Netherlands), the existing soil conditions and poor vegetation on the slope of the highly used multiline railway, lead to surface erosion and micro-instability problems. Based on these observations, it was decided to implement a Naue erosion control system to stabilize the slopes.

The railway line is most frequented by a train every 5 minutes. The works adjacent to the tracks required detailed planning preparation and permits with a fixed time frame of 6 working weeks for two locations. The workspace was very limited, knowing conditions with multiple railway lines on top and toe of the embankment. Most of the works had to be carried out with train tracks in service. All these challenging conditions make it essential to use a proven erosion control system that can be installed efficiently, fast and simply.

Solution

Based on the site conditions, a Naue Secumat® erosion control system was chosen to stabilise the slopes against surface erosion. The slopes rehabilitation includes two sides of a multiline railway slope. Both sides of the embankment will be protected using the Secumat® system. By installing a permanent erosion control mat with fitted fixings over an area of approx. 11,000m².

A Naue 3D installation drawing was prepared, which included all the panel numbering, installation details and quantity determination. The angled 2:3 slope has a height differentiation along the tracks with a maximum of approximately 6.5 meters at a bridge abutment.

At the beginning of the earthworks, the slopes were newly profiled. For profiling the 3D-model of the design is uploaded to the excavator equipment, to have direct data from the design levels into the machinery. At the toe of the slope and at the crest an anchoring trench is used to embed the erosion control mats sufficiently.

The chosen product is a geocomposite combining a soil retention artificial root structure with an integrated geogrid Secumat® 401 20/20 Q1 and fitted isosceles steel pin fixings, the Secumat® PinU 23. With the geogrid, the system can take tensile strength, which can occur at steeper slopes. The panels of the erosion control mats are installed next to each other, having no overlap and can be cut easily to length at the location. The mat is fixed with a specific pattern based on the system design. The reinforced, durable Secumat® 3D Mesh, in combination with the high-quality Secumat® PinU, securely fixes the system to the subsoil. This system is quick and easy to install. The erosion control mats form a reinforced and erosion-resistant covering layer on the railway slopes, which allows for revegetation. Thus, the system provides invisible, vegetated and permanent protection to the railway slopes.

As soon as the Secumat® is fixed and covered with soil, it takes over the erosion control function. It is particularly robust and provides good erosion control even under drought stress or heavy precipitation due to its artificial 3D mesh structure, a randomly oriented filament layer.

After installing the high-quality mats with suitable fixings, the slopes are finished with a fertile topsoil layer of approximately 5cm and seeded with a grass-herb mixture. With germination, plants establish and provide a green vegetated slope. It blends visually into the landscape. To stimulate ecological biodiversity, underground winter habitats are integrated for regional grass snakes on the site. Protective function and animal welfare are equally improved with the Secumat® erosion control system. Using the Naue erosion control system on railway embankments is a novelty in the Netherlands and makes this vital infrastructure climate resistant.