Secugrid®

Secugrid® reinforced soil to secure an old landfill site

- **Project name**
  Old landfill "Am Knochen",
  Raschau-Markersbach, Germany
- **Client**
  Municipality of Raschau-Markersbach, Germany
- **Construction company**
  TS Bau GmbH, Jena, Germany
- **Products**
  Secugrid® 40/40 Q6 Z
  Secumat® 401 G4
  Secutex® RZ 441

The old landfill "Am Knochen" is located north of the municipality of Raschau on a slope on the valley flank of the river Mittweida. It consists of a mining dump of SAG Wismut and the old dump of a former landfill. The transitions between the mine dump material, mainly in the west, and the landfill in the north and north-east are fluid.

The challenge

The slopes of the entire landfill body were considered unstable during the approval and design process due to their local steepness, the material properties of some of the deposits and the lack of structural support. The seepage water/groundwater could enter existing mining voids and from this level flow into the receiving watercourse in accordance with the existing bedrock pathways. There was a risk to the groundwater.

The solution

To improve the emission situation, it was necessary to remediate the waste dump and to include the mine dump in the remediation, considering the stability problems.

To create permanently stable embankments on the old landfill site, horizontally installed Secugrid® geogrids with a certificate of approval from the Federal Institute for Materials Research and Testing (BAM), Germany, were required for the construction of the RS structures (RRS = Reinforced Soil Structures) in accordance with the approval procedures. The used BAM-approved Secugrid® Z types have undergone exceptionally extensive testing and verification to be able to construct extremely durable structures.

The intended average slope inclination was designed to achieve approximately 45°. The maximum total height of the RSS is just under 21m, or a total of 62 layers of horizontally installed geosynthetic reinforcement layers. The geogrids were installed in the wrap-around method, using temporary formwork to achieve good compaction. To achieve the planned contour and inclination of the slope, short, intermediate berms were constructed at each layer. The wedges in the berm area are finally filled with topsoil. Installation on the steps prevents the covered topsoil from slipping. The topsoil outside the geogrid wraps is profiled and secured by an erosion control mat (Secumat®) followed by hydro-seeding. This construction method creates a stable and fully vegetated reinforced slope, which improves the overall stability of the structure.

Due to the special geometry of the RSS (above-average height) in combination with the subsoil conditions (in-situ soft subgrade soils), soil replacement in combination with base course reinforcement was carried out. Several layers of horizontal geogrid reinforcement were then installed before the actual RSS was constructed.

After extensive pre-profiling the actual construction of the RSS began in early 2022. PET geogrids with a characteristic short-term tensile strength of 40 to 80 kN/m were installed in layers. The Naue Secugrid® geogrids used are characterised by high robustness against potential installation damage and low creep tendency. These properties ensure a safe RSS with very limited deformations throughout its service life.

During the construction process, after the application of a BAM-approved 400 g/m^2 separation and filtration nonwoven (Secutex®), a granular drainage layer (32/56 mm) was installed at the rear of the RSS to drain the fill material during construction, with corresponding seepage water collection at the base of the RSS structure.

As part of the completion, an approximately 3.0m wide service road with guardrail is to be constructed at the top of the RSS and a landfill side drainage trough is to be constructed. Both components will be secured at the bottom with a geomembrane to prevent rainwater from entering the RSS and the landfill body in the future.

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