

Using Geosynthetics to Cover Prep Plant Impoundments During Abandonment Phase

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- # **Backfilling**
- # **Filling with on-site materials**

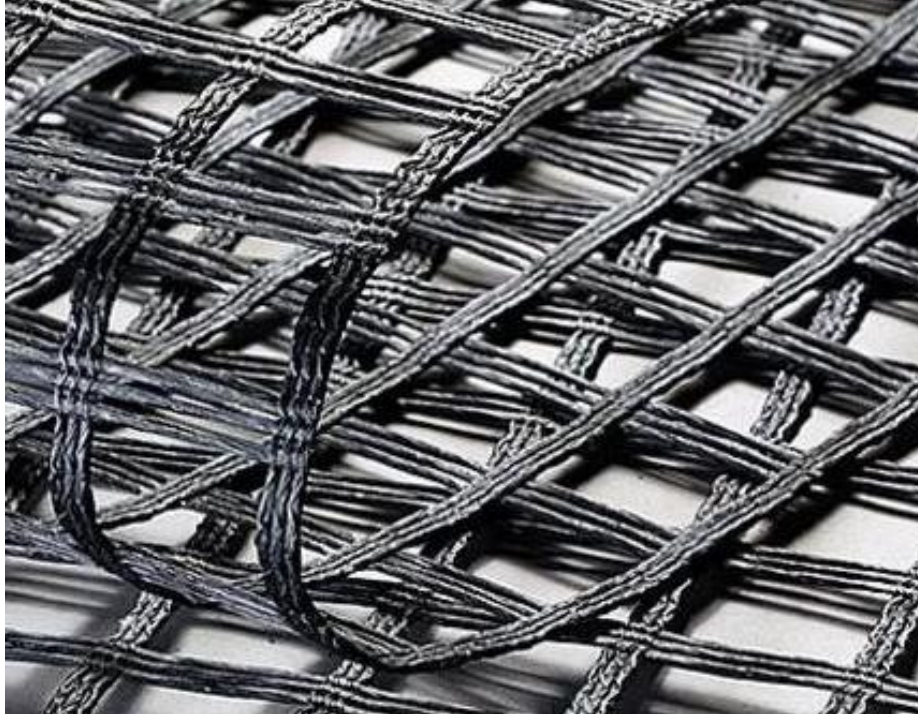


If Neither Option is Available, Process is Costly Due to:

- # Transportation costs of prep plant refuse**
- # Rendering coarse refuse unavailable for other projects and structures**
- # Time required to fill**
- # Management of fines**
- # Possible use of off-site or remotely located materials**



Geosynthetic Reinforcing Elements



Geogrid



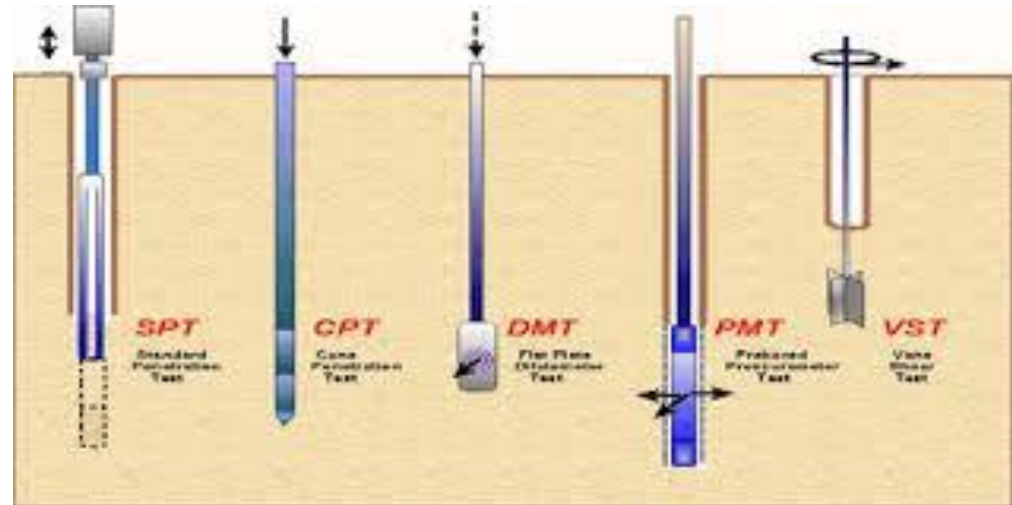
Woven

Function of Geosynthetics

- # Crust can take years to consolidate sufficiently to gain safe access**
- # Add strength to crust so that impoundment can be reclaimed quickly**
- # High-strength fabrics separate fines and crust, but allow water to permeate to dewater**
- # Geogrids reinforce crust to allow soil cover to be installed for final closure and reclamation**

Properties of Impoundments

- # Crust forms, but bearing capacity is unknown.
- # 'Pudding' forms under the crust, which is unstable and weak
- # Bearing capacity of the crust can be determined using geotechnical testing

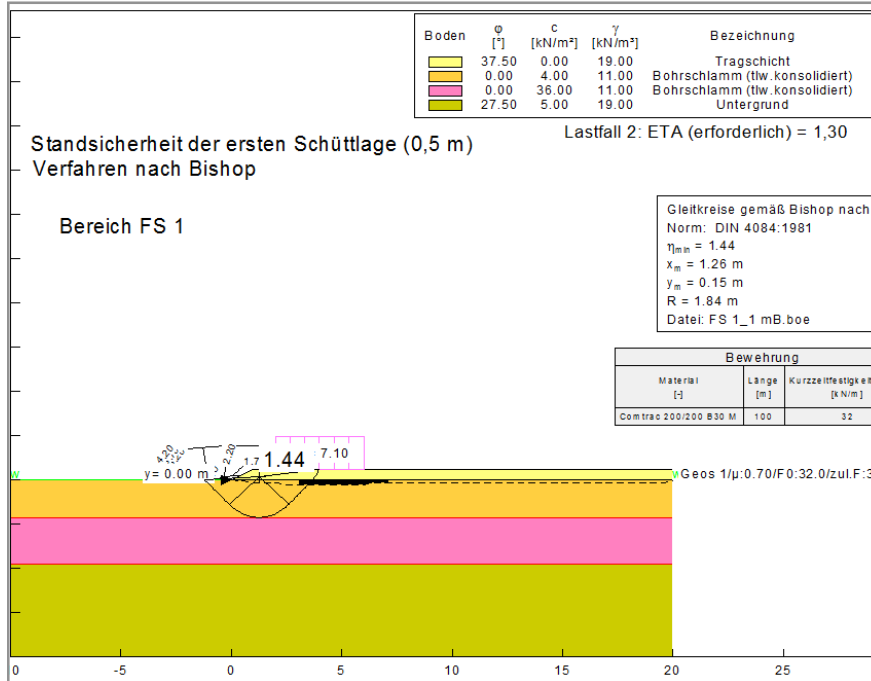


Safety of Installation is Paramount

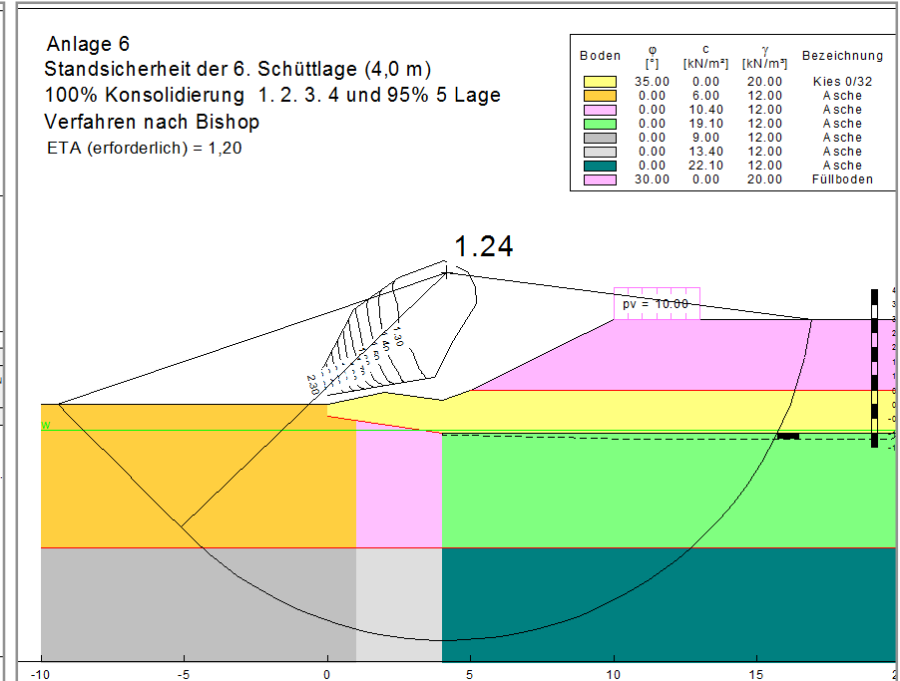
- # Goal is to use manned equipment to install geosynthetics and soil cover
- # Access to crust must be safe



Stability design



- Ground failure acc. to Bishop



- „Multi zone model“ acc. to Bishop

Increase of undrained shear strength acc. to Bjerrum (1973):

$$\Delta c_u = 0.2 \dots 0.25 \times \Delta \sigma_v \times U$$

Stability design: Espinoza, Sabatini, Steier, Steiner (Geosyntec, Parsons)

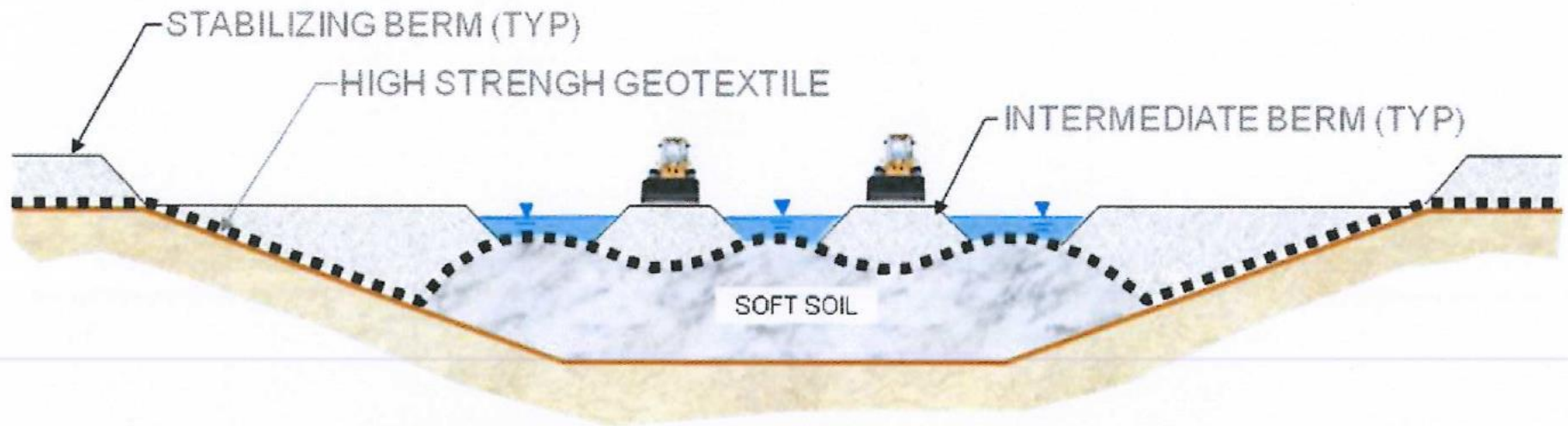
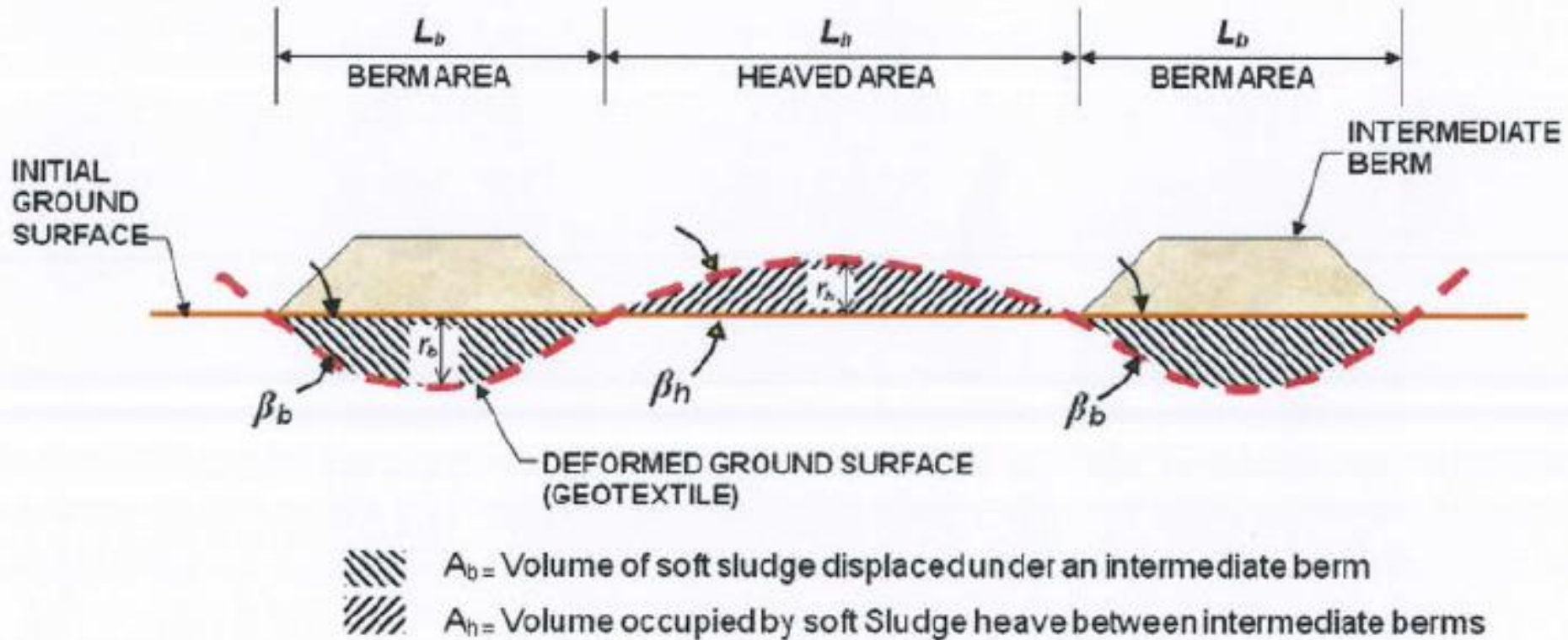
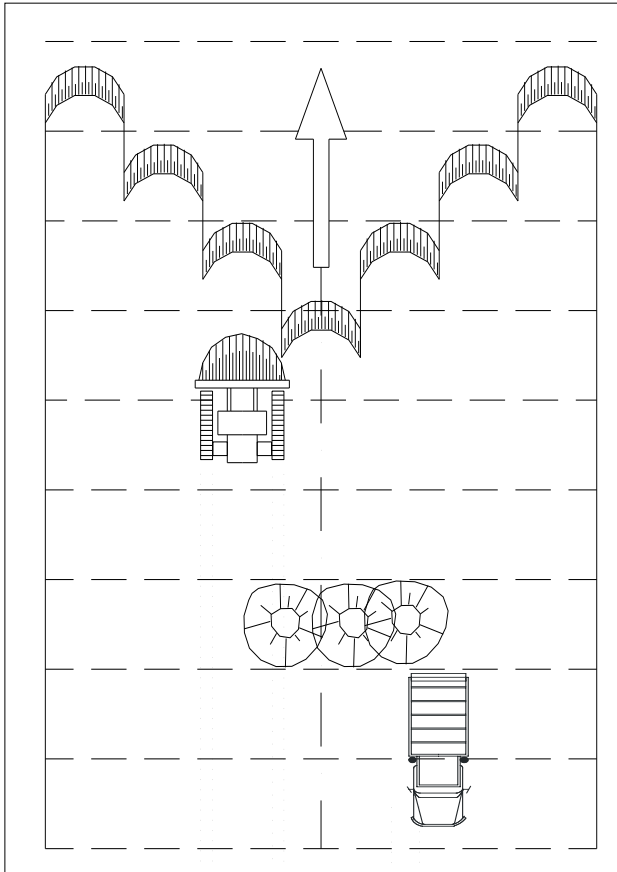


Figure 4 – Placement of High-Strength Geotextile and Soil Berm

Stability design: Espinoza, Sabatini, Steier, Steiner (Geosyntec, Parsons)

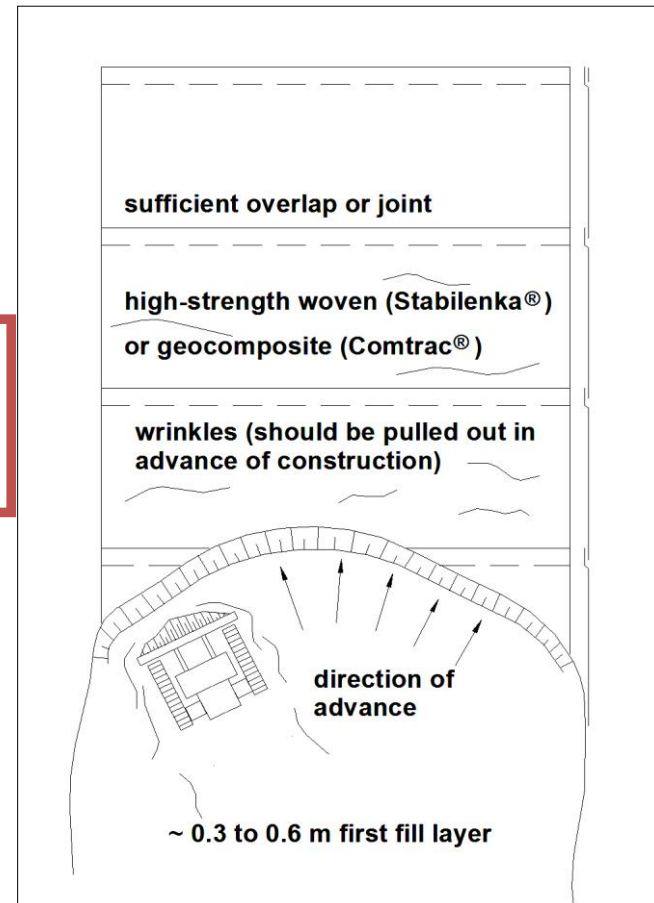


Very weak sludge:

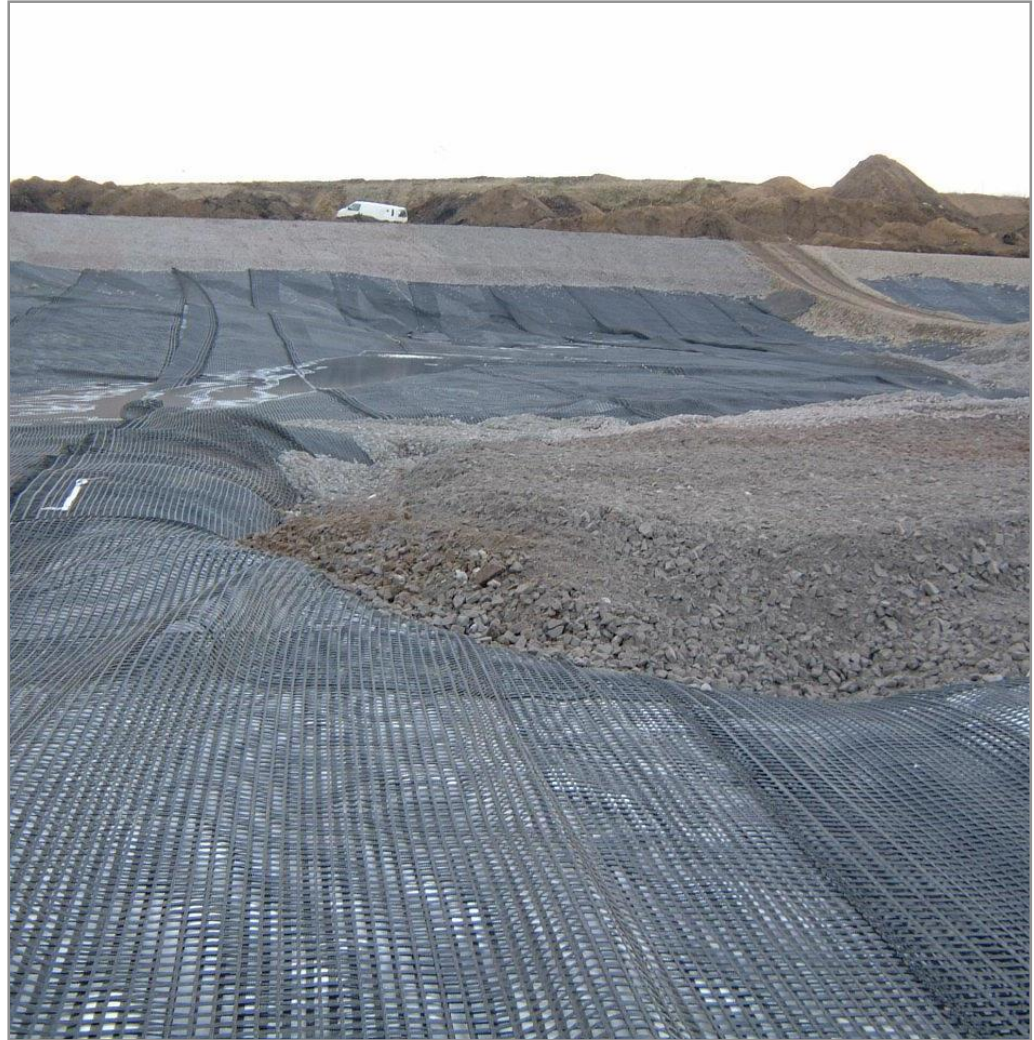


Complete Coverage Concept

Stiffer sludge:



- # Woven fabric (white) provided separation and filtration
- # Geogrid (black) provided strength and reinforcement
- # Notice heaving fines in front of soil fingers
- # Soil cover must be installed carefully







Thank you for your time,
and be safe!

Questions

