

*Rehabilitation d'une ancienne decharge industrielle au moyen
d'une couverture active multifonctionnelle etanche*

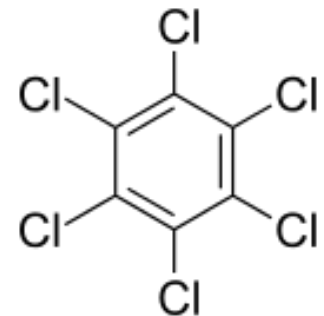
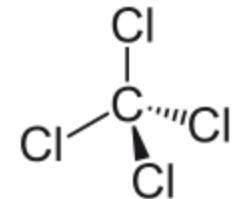
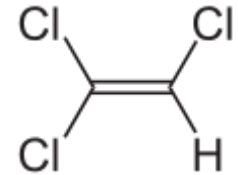
*Remediation of a former industrial landfill using a multifunctional
active surface sealing*



- # History of the K20 Site
- # Multifunctional Active Surface Sealing
- # Analysis of Structural Stability
- # Construction Site

Former Use

- # Filled between 1926 and 1981
- # Stored Material
 - # Blue Chalk (By-Product from Acetylene Synthesis)
 - # Ash, slag, Construction waste
 - # Mercury contaminated Waste
 - # Chlorinated Hydrocarbons (CHC) containing sludge and filter cakes
- # Contained CHC:
 - # Volatile: Trichlorethen, Tetrachloromethane etc.
 - # Non-Volatile: Hexachlorobenzene, Hexachlorobutadiene etc.



Remediation measures

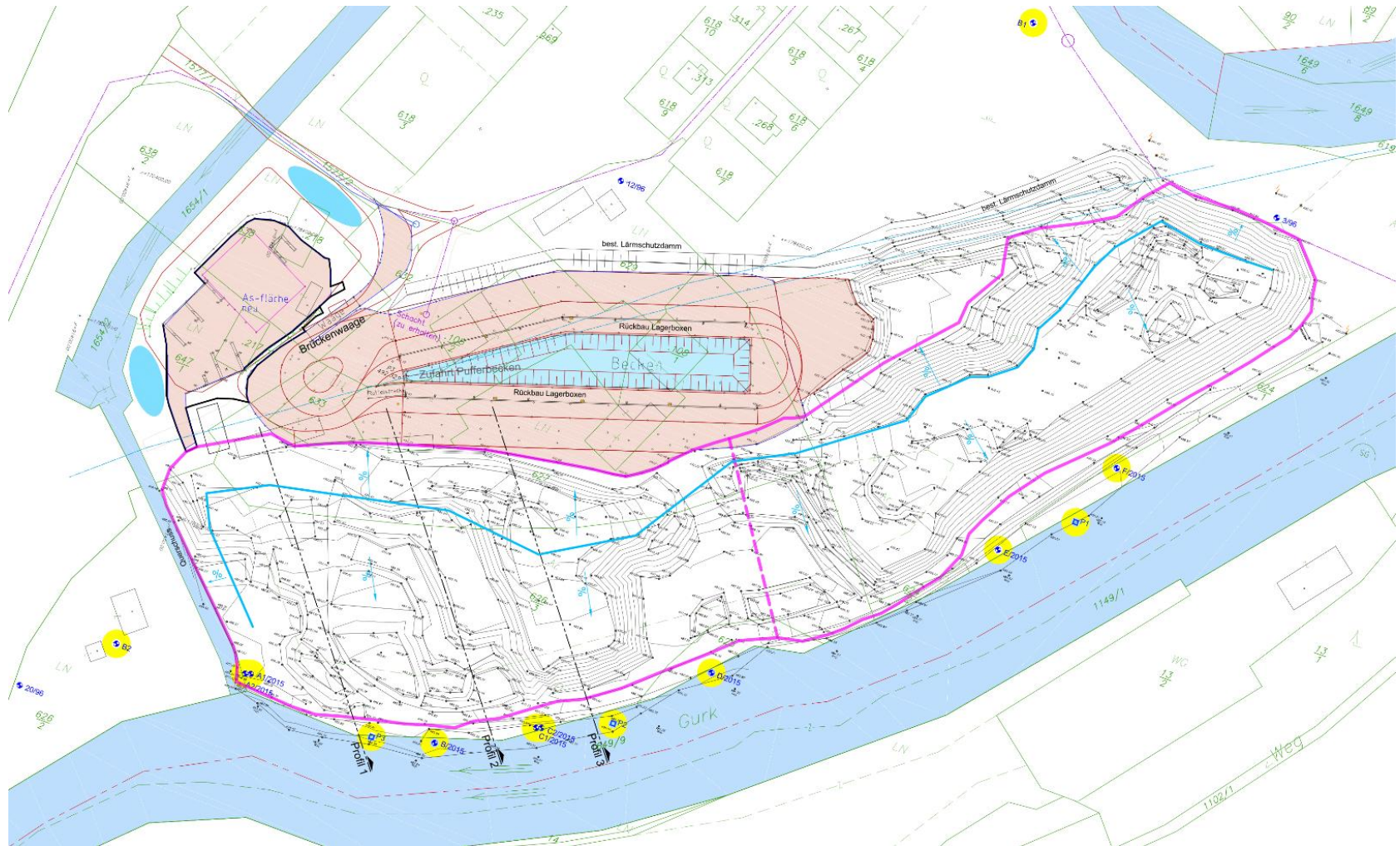
- # Since 1995 running soil vapor extraction and conducting evidence collecting measures
- # Since 2000 the contaminated Site K20 was listed in the official list of contaminated sites
- # In 2003 it was classed priority 1
- # Notice issued to remediate by thermal treatment at minimum 900°C
- # Thermal treatment started in 2012/13 in a rotary furnace of a cement plant



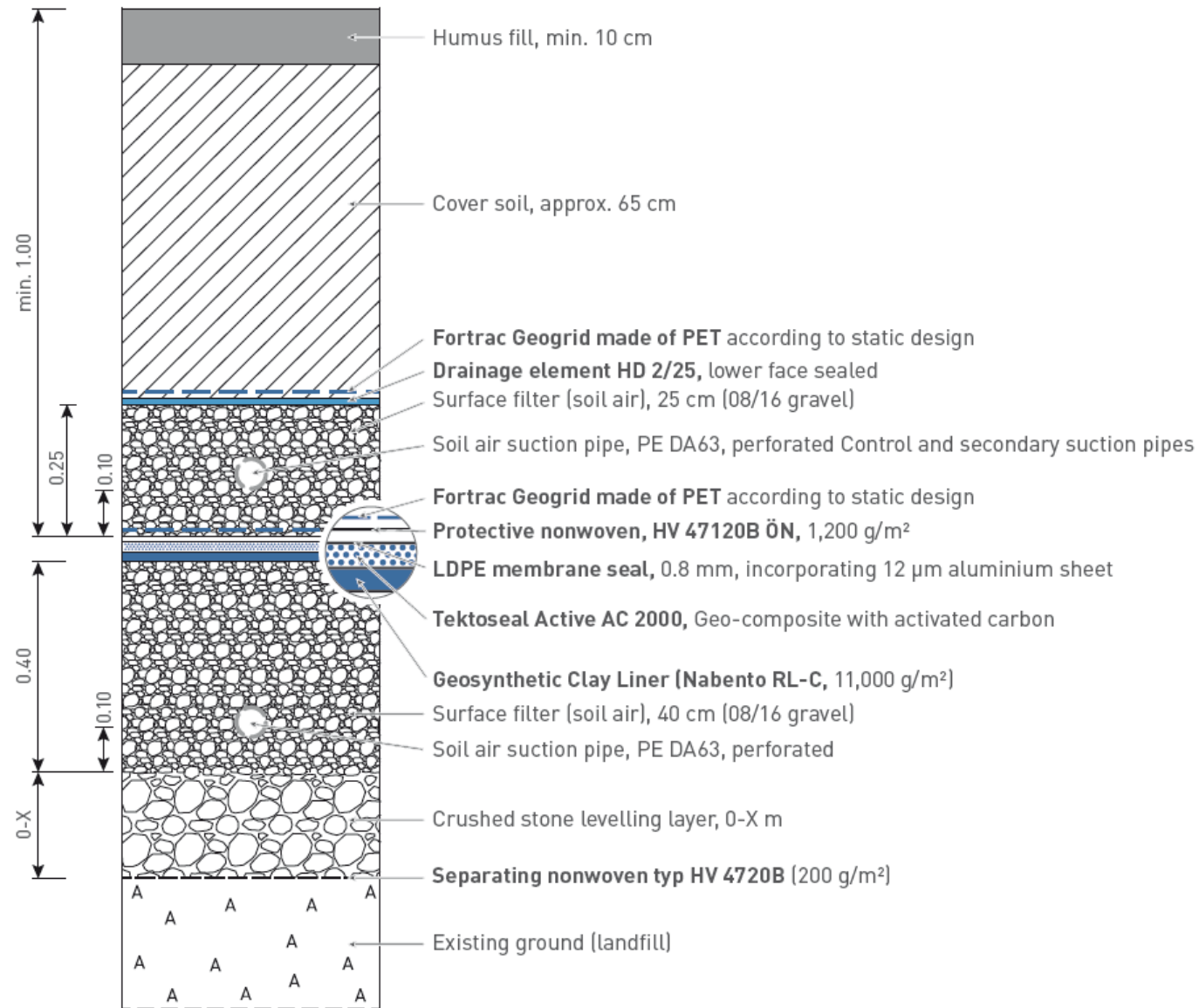
New invitation to tender

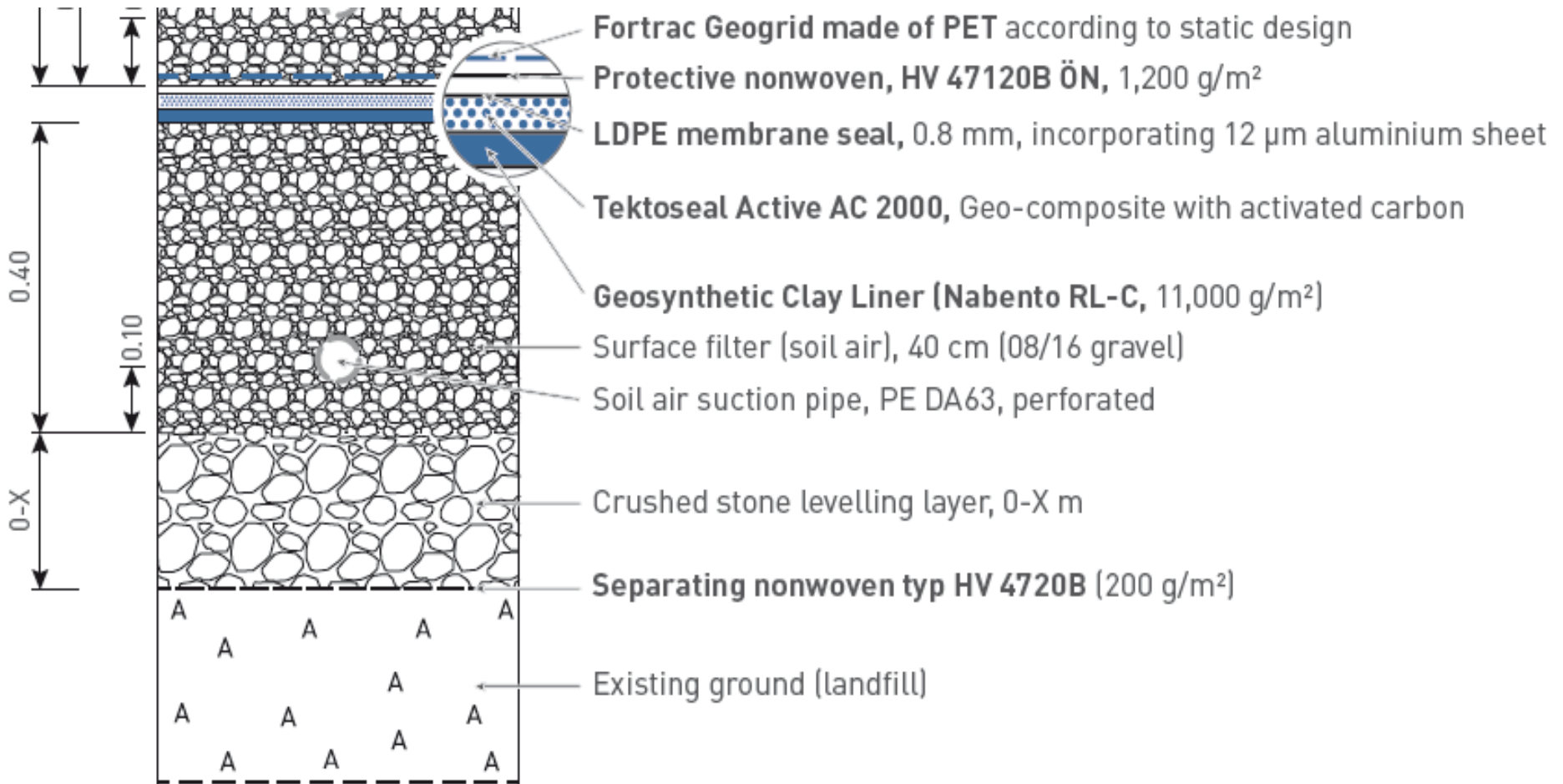
- # In November 2014, when **hexachlorobenzene** was detected – among other things, in **locally produced food** in close proximity to the cement plant, the excavation and treatment was stopped
- # a new pan-European call for tenders for transportation and treatment of the material was resulted in: "**no project involving continued site clearance could offer legal, technical, time or cost certainty**"
- # In July 2016 a new securing concept was published by GWU

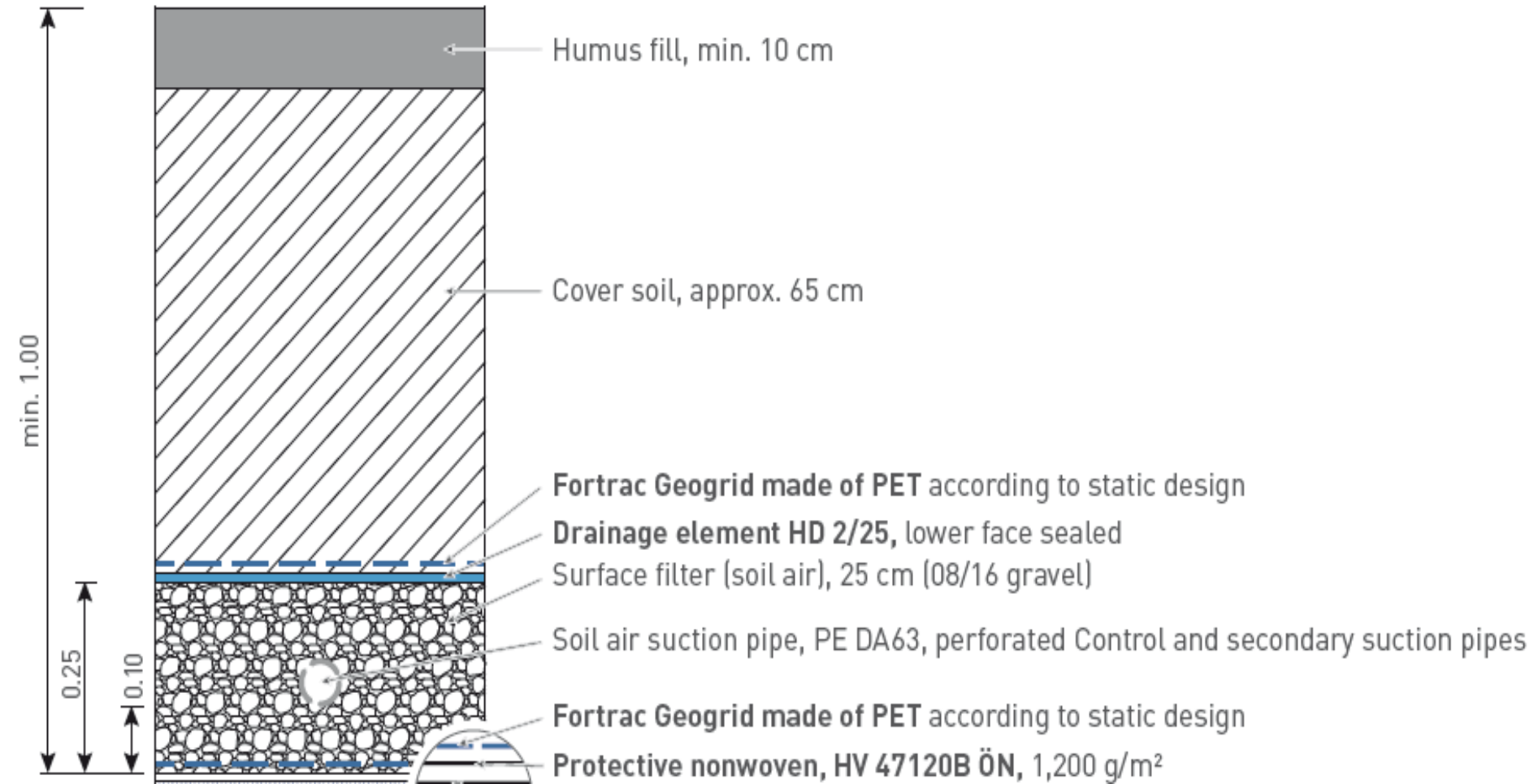




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NaBento RL-C Calcium bentonite mat

- # 10.000 g/m² Calcium bentonite
- # Preventing natural ion exchange of sodium bentonite
- # Improved external shear strength due to a coating with bitumen and expended clay this results in a friction angle up to 37°
- # Roll width 5,1 m



Tektoseal Active AC 2000

- # 2.000 g/m² Coconut shell activated carbon
- # Activated carbon binds the CHC materials which reduces their concentration below the liner
 - # This also reduces the driving force for the diffusion
- # Minor dust formation during installation because of the use of granular activated carbon
- # Constant active layer thickness across the entire installed area, independent from inclinations
- # Roll width 5,1 m



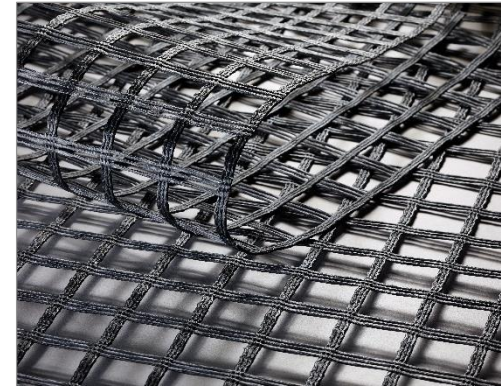
PE-LD Barrier layer

- # 0,8 mm LDPE Liner
- # 12 μm gas tight Aluminum layer
- # Textile reinforced material
- # Welded with testable double square butt joints
- # Roll width 2,2 m



Fortrac Geogrid

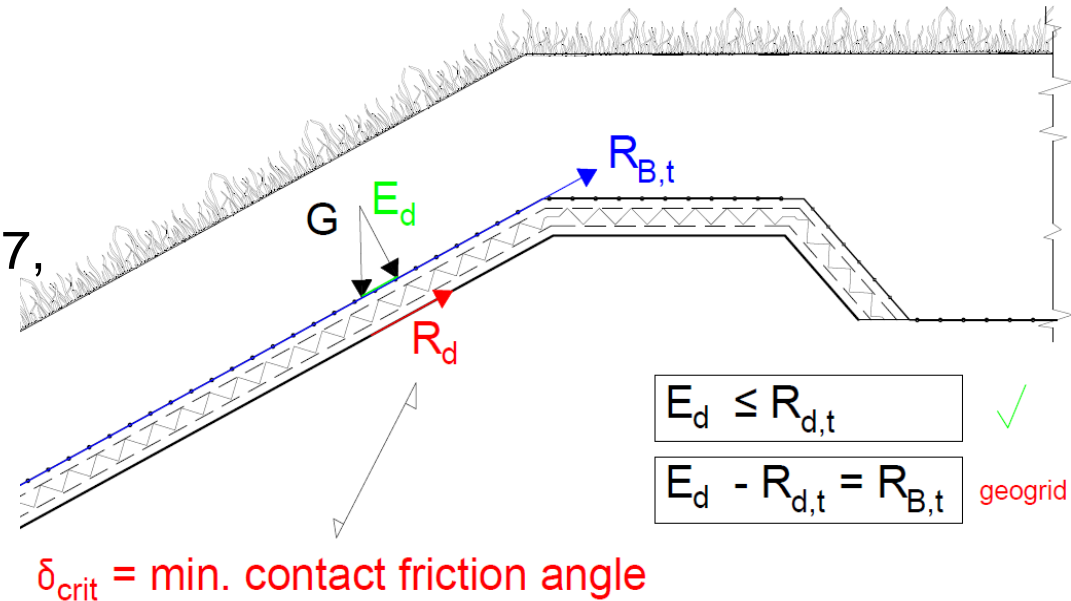
- # High available strength up to 2500kN
- # Excellent long-term performance due to low creep
- # Project-specific choice of raw materials possible
- # High resistance to chemicals and microorganisms in soil, UV radiation and mechanical damage
- # Roll widths 5 m



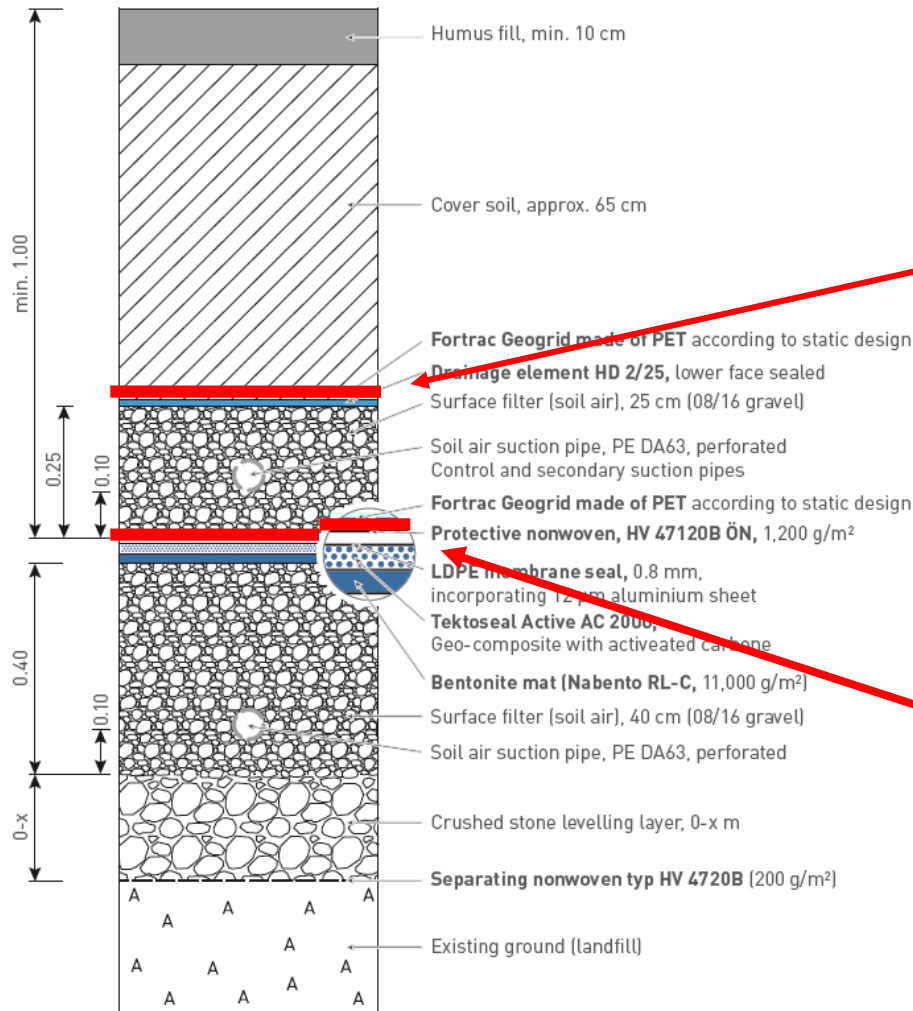
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Slipping parallel to slopes

- # 1:2 slopes due to on site situation
- # Maximum slope length of 45 m
- # Calculations based on GDA E2-7, according to Chpt. 8 EBGEO
- # External shear test have been conducted for 9 potential slip planes



Slip planes

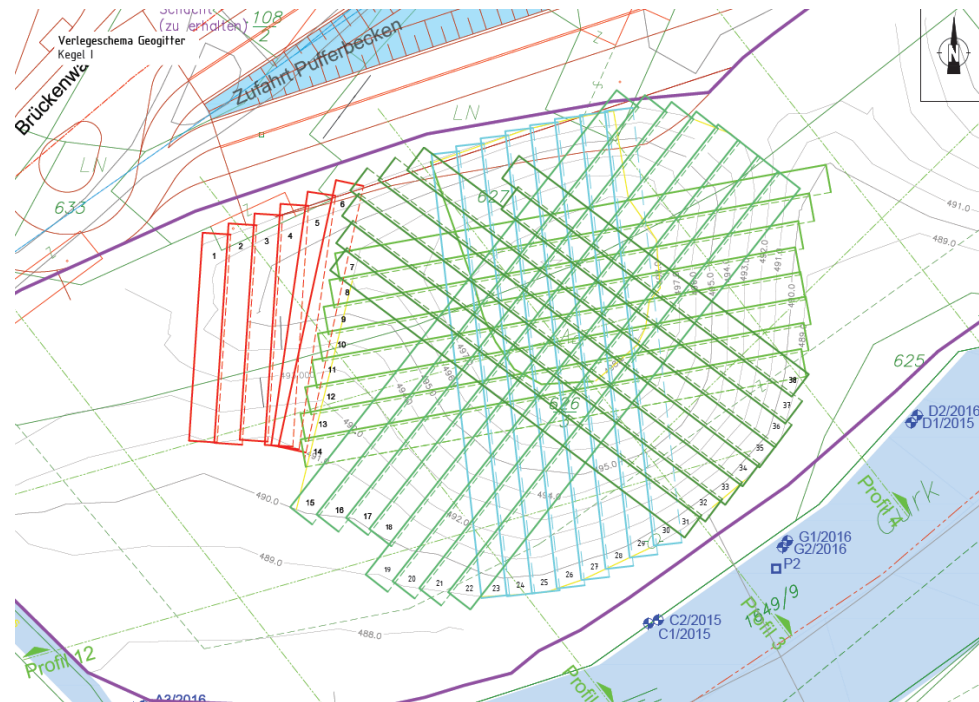


Internal shear strength of
drainage element $\delta = 23^\circ$
Nominal tensile strength up
to 200 kN/m

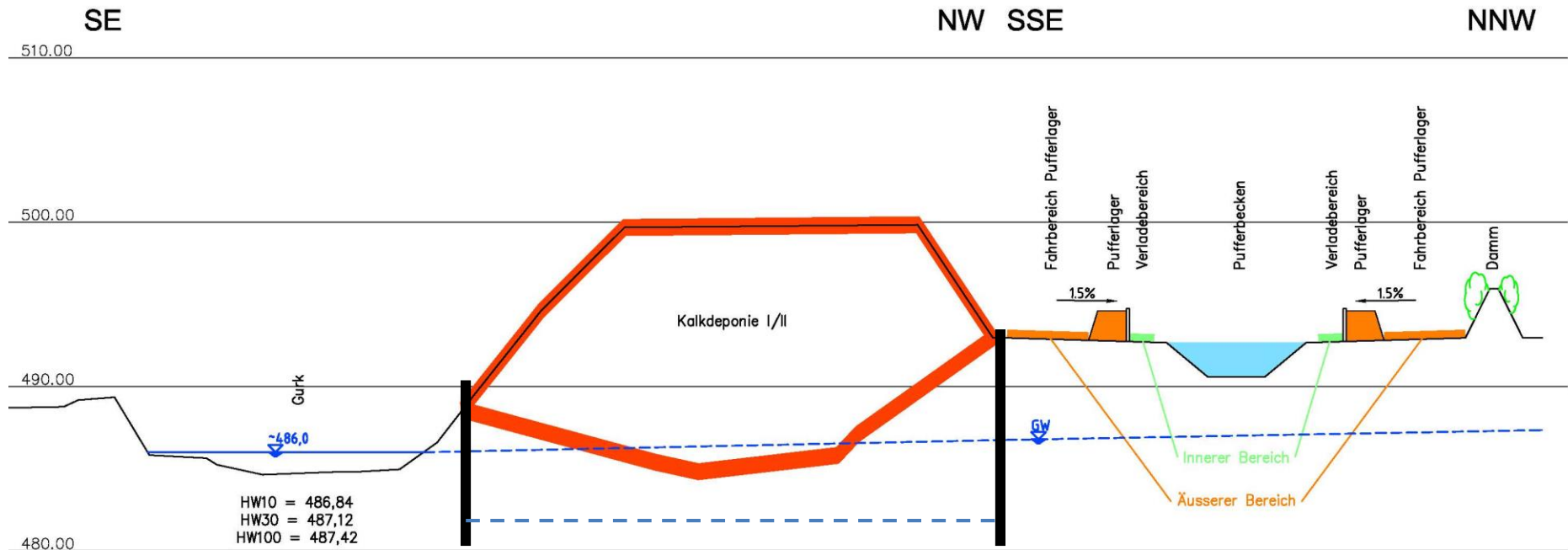
Critical slip plane between
PE-LD barrier layer and
the protection nonwoven
 $\delta = 10,5^\circ$ nominal tensile
strength up to 600 kN/m

Layout plan and anchoring

- # No possibility to use anchor trenches
- # Anchorage length up to 66 m with 1 m cover layer
- # Available length only 25-32 m
- # **Solution:** saddle-shaped lining with a single continuous geogrid extending over opposite slopes
- # To avoid imbalances simultaneous parallel placement of soil on the slopes needed



Critical aspect: ground water contact



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Covering the K20 12.12.2016



Covering the K20 15.03.2017



Covering the K20 15.03.2017



Covering the K20 28.03.2017



Covering the K20 28.03.2017



- # Donau Chemie AG
- # IB GWU Geologie-Wasser-Umwelt, Salzburg
- # ARGE San. Altlast K20
- # PORR Umwelttechnik GmbH, Wien
- # IAT GmbH, Weitensfeld
- # STRABAG AG, Wien
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