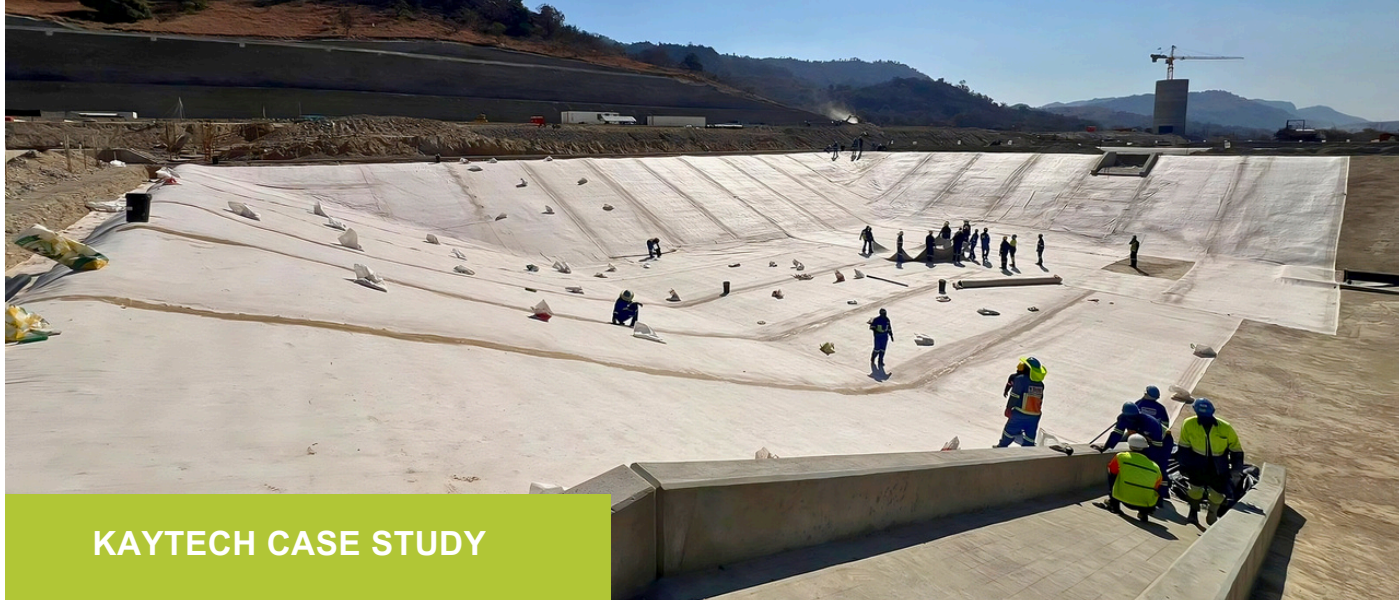




KAYTECH CASE STUDY

POLLUTION CONTROL DAM USING A COMPOSITE LINER SYSTEM

GEOSYNTHETICS USED

bidim®: A continuous filament nonwoven needlepunched geotextile.

bidim® A6: Serves as a protective layer between the HDPE liner and geocells, reducing puncture risk from fill and slope materials.

EnviroFix®: A Geosynthetic Clay Liner (GCL) consisting of sodium bentonite encapsulated between geotextile layers.

EnviroFix® X1000: Installed as the secondary containment layer beneath the HDPE geomembrane.

Multi-Cell® HD: High-density polyethylene geocellular system confining the liner on the dam slopes.



CONTACT



Christiaan Van Wyk



083 265 7089



christiaanv@kaytech.co.za



www.kaytech.co.za



53 Harris Avenue, Sebenza,
Edenvale, Johannesburg

PROJECT DESCRIPTION

At the Der Brochen Pollution Control Dam (PCD), a Class C containment system was required to meet water use licence regulations and prevent environmental contamination. Traditional Class C specifications call for multiple layers of compacted clay to provide a low-permeability barrier. However, suitable local clay sources were insufficient, necessitating an alternative solution that could achieve the required hydraulic performance while supporting the dam's slopes, facilitating maintenance access, and maintaining long-term regulatory compliance. A geosynthetic composite liner system was therefore incorporated into the design to meet these requirements efficiently.

A BETTER SOLUTION

Composite liner systems integrate multiple geosynthetic layers to achieve low permeability, structural stability, and protection. In this application, a Geosynthetic Clay Liner (GCL) provides the secondary containment barrier, with sodium bentonite forming a low-permeability layer that swells upon hydration to seal potential voids and prevent leakage (Koerner, 2012; Daniel & Koerner, 2007). The GCL is stabilised and confined by geocellular structures, maintaining consistent performance under environmental and operational conditions.

At this PCD, WBHO installed EnviroFix® X1000 GCL as the secondary liner beneath a high-density polyethylene (HDPE) geomembrane, which served as the primary barrier. A protective bidim® A6 geotextile was placed above the HDPE to prevent puncture from the slope confinement system. Multi-Cell® HD geocells were deployed along the dam slopes to anchor and confine the lining system, providing slope stability and allowing access for inspections and maintenance. This arrangement ensured a robust, durable containment system despite limited natural clay availability. The composite liner system successfully met Class C hydraulic performance requirements, limiting seepage and protecting surrounding water sources.

The completed system combines the HDPE geomembrane as the primary hydraulic barrier with the GCL as an additional low-permeability layer. The infilled geocellular system promotes consistent confinement and intimate contact between barrier components, supporting effective hydraulic performance, while the bidim® geotextile protects against puncture and mechanical damage. Together, these elements provide a robust and durable barrier system for long-term performance.



HDPE geomembrane deployed over the GCL.



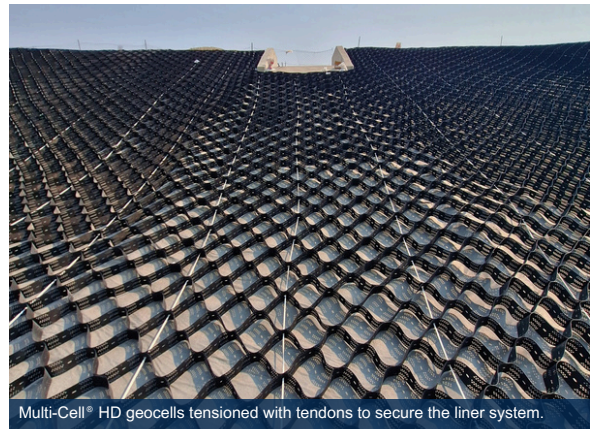
EnviroFix® positioned on the dam base to form the secondary containment layer.



bidim® geotextile rolled out over the HDPE.



Multi-Cell® HD geocells installed along the dam slopes to confine the liner system.



Multi-Cell® HD geocells tensioned with tendons to secure the liner system.

Did you know?



Slope Maintenance Access

The geocellular system permits periodic inspection and maintenance of the dam slopes without disturbing the GCL or geomembrane, supporting long-term operational reliability.



Protection Layer Efficiency

bidim® geotextile reduces the risk of puncture during installation and from overlying fill, allowing thicker, heavier slope material to be placed without compromising liner integrity.



Hydraulic Performance Validation

Composite liner systems are designed to exceed Class C permeability requirements through combined low-permeability layers, and confinement ensures that the GCL maintains target hydraulic conductivity over time.