



TenCate Solutions for Environmental Sustainability





Polyfelt® Enviromat Geosynthetic Clay Liner

Effective sealing against liquid migration

Case Study

project	Recreation Pond Lining
location	Malaysia

A major sporting event where Malaysia was to play host was coming up. To facilitate the sporting event, several large sports facilities were required to be constructed within tight deadlines. The construction package included the construction of several decorative ponds in the vicinity of the sports village. For easy and rapid construction, TenCate Polyfelt® Enviromat GCL was used as a moisture barrier to line the bottom of the ponds. The low permeability clay inside TenCate Polyfelt® Enviromat quickly swelled when in contact with moisture providing a permanent barrier for water containment. The flexibility of TenCate Polyfelt® Enviromat enabled it to conform to the contour of the ponds and was an important feature in this project.

TenCate Polyfelt® Enviromat geosynthetic clay liner (GCL) is made from high quality polypropylene geotextiles and premium grade granular bentonite. The granular bentonite sealing compound is encapsulated between the geotextile layers that are held together through dense needle-punching and heat treatment process. This provides high shear strength in the GCL making it suitable for application on slopes. It also ensures that the granular bentonite is uniformly and securely contained to deliver superior performance.

High quality bentonite will exhibit similar hydraulic properties whether in powder or granular form. However, granular bentonite offers several benefits over powder bentonite: it does not disperse easily during handling and installation. This ensures consistencies in the mass per unit area of the GCL, resulting in consistent and superior fluid barrier performance. Granular bentonite minimises the contamination of the welded seams of geomembranes, making on-site seam welding easy and with assured quality. It also minimises clogging of the underlying drainage layer.

Typical applications of TenCate Polyfelt® Enviromat GCL include water retention or recreational ponds, reservoirs, canals, secondary containment of storage tanks, and landfill base liners.



TenCate Polyfelt® Enviromat GCL.



Laying Polyfelt® Enviromat GCL using crane.



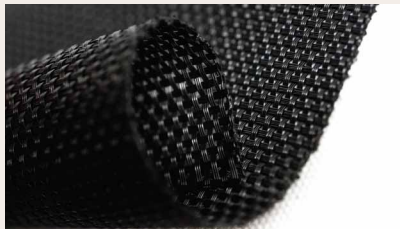
Mirafi® FW High Performance Filtration Geotextile

Leachate filtration and landfill cover system

TenCate Mirafi® FW is a high performance woven geotextile designed to reliably perform filtration and reinforcement functions in waste landfill engineering.

In leachate filtration, studies have shown that optimum filtration requires a filter with opening stability and high permeability, capable of withstanding the effects of diverse leachate concentrations and flow rates. TenCate Mirafi® FW geotextiles are engineered to provide stable and uniform opening sizes to ensure high permeability even under varying load stresses. Inert to biological and microbial clogging, its robust nature ensures a long term filtration performance.

For landfill cover systems, TenCate Mirafi® FW geotextiles keep the soil cover intact and allow infiltrating surface water into the drainage system, thus minimising water getting into the landfill. The superior filtration performance of TenCate Mirafi® FW helps minimise the stresses exerted by the fluid on the lining system, therefore ensuring the long term structural stability of the landfills.



TenCate Mirafi® FW geotextile.



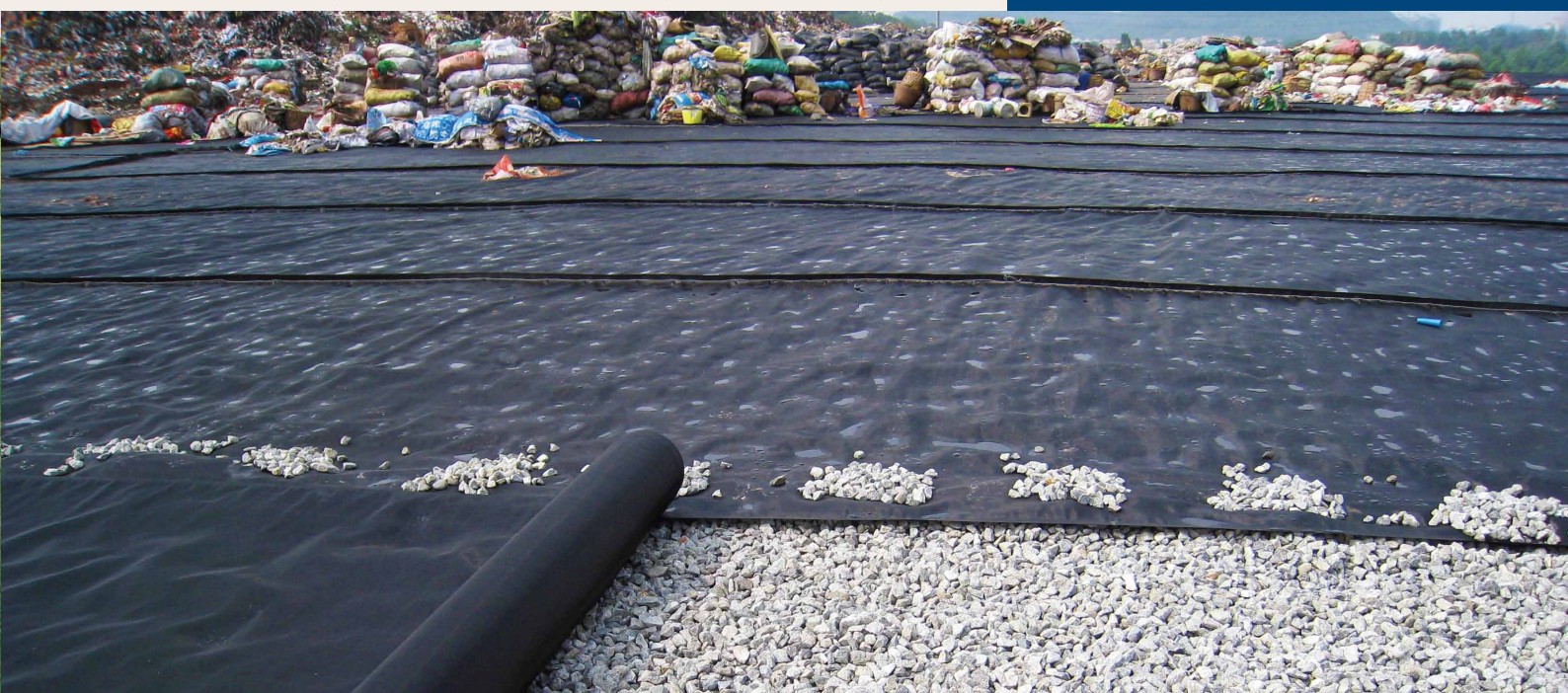
Installing Mirafi® FW across a major landfill.



Case Study

project	Waste Landfill Filtration
location	China

An engineered landfill required the internal leachate head acting on the base gravel drainage layer to be a minimum. To achieve this, and to prevent clogging of the gravel drainage layer over time, a TenCate Mirafi® FW woven geotextile filter was placed across the top of the drainage layer prior to the initial placement of the waste. The simple uniform pore structure of TenCate Mirafi® FW geotextile filter enables the effective filtration of the landfill leachate while at the same time, minimises the leachate head build-up above the base drainage layer. This aids the decomposition of the waste and helps with the effective sealing of the base of the landfill.





Polyfelt® DN, Polyfelt® DC and Polyfelt® DF

Leachate collection and removal system

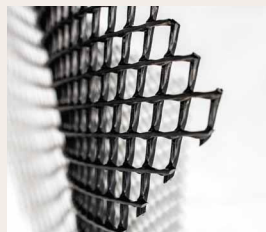
Case Study

project	MSW Landfill Design
location	Thailand

The usual 200 to 300mm thick drainage aggregate was replaced by the use of TenCate Polyfelt® Geonet in this landfill project. TenCate Polyfelt® Geonet was placed directly over the lining system and overlain by a TenCate Mirafi® FW geotextile filter. This construction method was ideal in this case where single sized aggregate was not readily available near the construction site. The use of TenCate Polyfelt® Geonet offered several benefits such as reduced stresses exerted on the lining system and provided high planar flow of leachate to the collection system. The installation of TenCate Polyfelt® Geonet was fast and created more volume for waste disposal in the landfill.

TenCate Polyfelt® DN geonets are made from HDPE to form three-dimensional channels that provide high flow drainage capacity. TenCate Polyfelt® DN geonet when bonded with nonwoven geotextiles either on one side or both sides of the geonet provide a drainage composite, TenCate Polyfelt® DC, which offers a combination of drainage and filtration functions. TenCate Polyfelt® DN and TenCate Polyfelt® DC are ideal for transmitting fluid in applications such as behind retaining walls, landfill design as leachate or gas drainage layer, sport fields, garden landscapes, and below slab water pressure release. The benefits of TenCate Polyfelt® DN and TenCate Polyfelt® DC over conventional drainage aggregates are less potential to clogging, easy to construct and low cost especially when aggregates are scarce.

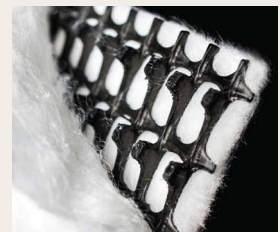
In applications where the normal load is high, TenCate Polyfelt® DF is ideal due to its high compressive strength and its ability to maintain high in-plane water flow under pressure.



TenCate Polyfelt® DN.



TenCate Polyfelt® DC.



TenCate Polyfelt® DF.



Polyfelt® Envirocell Cellular Soil Confinement System

Effective slope stability and load support

TenCate Polyfelt® Envirocell is a high performance geocell manufactured from inert polyethylene and ultrasonically bonded to form a cellular confinement system. The interconnected cellular structure provides lateral confinement of various infill materials such as soil, granular material and concrete.

This cellular confinement system is suitable for stabilizing and vegetating steep barren slopes, increasing the load bearing capacity of subgrades and can be used as a facing system for vertical or steep retaining structures. It is ideal for lining and protecting river channels and bridge piers that are at high risk to soil erosion.

TenCate Polyfelt® Envirocell cellular confinement system is impervious to the effects of chemicals in the soil or degradation from prolonged exposure to sunlight. It is highly versatile, easy to install and is a cost effective alternative to conventional soil erosion protection or soil retention methods.



TenCate Polyfelt® Envirocell.



Polyfelt® Envirocell *increases the load bearing capacity of subgrades.*



Case Study

project	Steep Slope Erosion Protection
location	The Philippines

To prevent the long term surface soil erosion of a new cut slope at a resort hotel, TenCate Polyfelt® Envirocell was used. The slope surface was cut into berms of approximately 3m high and with an inclination of 70°. Due to the barren steep slope surface, it was not possible for quick vegetation growth before the soil on the slope surface started to erode. TenCate Polyfelt® Envirocell was placed on the slope surface and anchored in place using a combination of a trench across the top of each berm and steel pins on the slope surface. TenCate Polyfelt® Envirocell was then infilled with soil and grass seed.





Polyfelt® Polymat EM Erosion Control Mats

Soil erosion prevention mats with vegetation stimulation

Case Study

project River Channel Lining

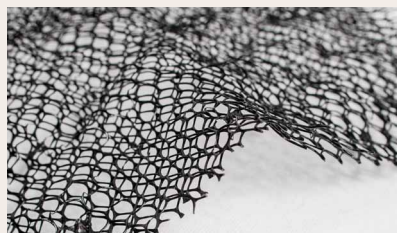
location Indonesia

An existing river channel was widened to increase its water carrying capacity as a result of frequent flooding near the area. The excavation made the bare slope surface susceptible to soil erosion and required immediate cover. To address this problem, TenCate Polyfelt® Polymat EM erosion control mat was placed on the slope surface. The mat was anchored at the top of the slope and secured to the slope surface using pins at about 1m spacing. Topsoil was then placed over TenCate Polyfelt® Polymat EM. The three-dimensional structure of TenCate Polyfelt® Polymat EM provided immediate soil erosion protection and contained the topsoil for vegetation growth that further protected the slope from erosion.

Natural vegetation is the most environmentally friendly form of erosion protection that also greens and stabilizes slopes. TenCate Polyfelt® Polymat EM is made from high density polyethylene fibres to form a three-dimensional mat structure.

Heavy rain during the initial root development phase can lead to erosion and threaten successful vegetation growth. TenCate Polyfelt® Polymat EM is designed to reduce the impact of rain and retain the topsoil that provides support for vegetation growth on steep slopes. This erosion control mat provides instantaneous slope protection and is easy to install. It is a flexible mat which conforms to slope irregularities.

Typical application areas include slopes, riverbanks, lakes, reservoirs, ponds, storm water channels, road embankments and cuttings, reinforced soil structures, noise barriers, landscapes and landfill covers.



TenCate Polyfelt® Polymat EM



A vegetated reinforced soil slope with Polyfelt® Polymat EM.



Polyfelt® Envirofelt CF & CTRM Biodegradable Erosion Control Mats

Enhance slope surface stability

TenCate Polyfelt® Envirofelt offers a range of erosion control mats for surface erosion protection of slopes. Envirofelt CF is a 100% biodegradable mat made from natural fibres which stimulates grass and vegetation growth to prevent erosion of topsoil and enhance the stability of slopes. Envirofelt CTRM is a natural fibre mat reinforced with polypropylene mesh to provide better reinforcement to steep slopes whilst facilitating grass and vegetation growth. The mats support the development of natural vegetation from its root development phase until it establishes a permanent erosion control function. The degradation of natural fibres provides additional nutrients to the plants while water storage capacity of the natural fibres prevents the soil from drying out.

Typical application areas include slopes, riverbanks, lakes, reservoirs, ponds, storm water channels, road embankments and cuttings, reinforced soil structures, noise barriers, landscapes and landfill covers.



TenCate Polyfelt® Envirofelt



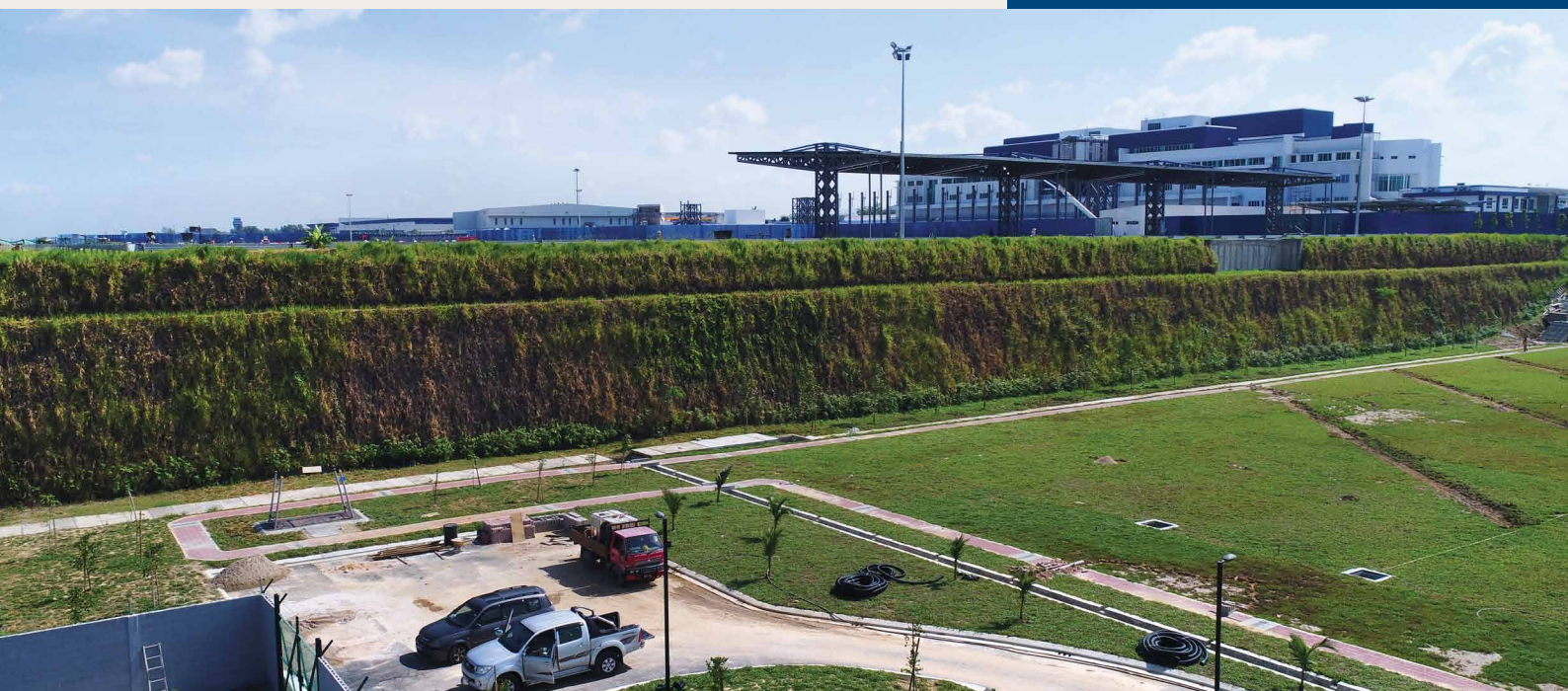
TenCate Polyfelt® Envirofelt laid over a reinforced soil slope.



Case Study

project	Slope Erosion Control
location	Malaysia

A reinforced soil structure with vegetation facing has to be constructed to maximise the use of land to contain solid waste for a landfill project. As an environmental friendly solution was required to promote vegetation growth that blends in well with the surrounding environment, TenCate Polyfelt® Envirofelt CF biodegradable erosion protection mats was anchored on the surface of the slopes. TenCate Polyfelt® Envirofelt CF effectively prevented the soil from drying out and maintained soil nutrients while trapping the grass seeds to support vegetation growth. After the successful establishment of vegetation, the surface of the soil structure was protected from erosion.



TenCate develops and produces quality products that increase performance, reduce cost, and deliver measurable results by working with our customers to provide advanced solutions.

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