

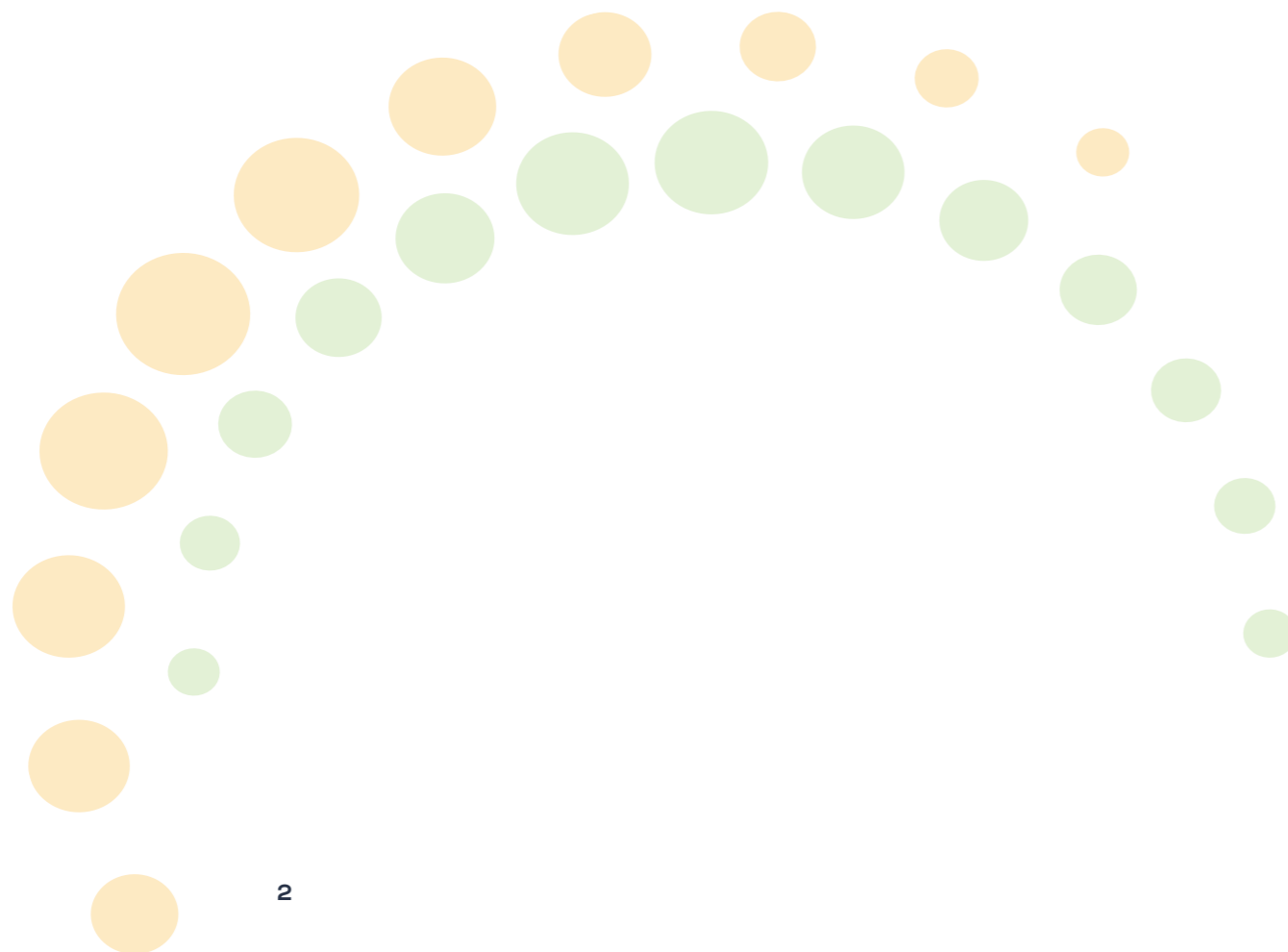


# Water & Ports

High quality geosynthetic systems  
for Water & Ports applications

- **Contents**

Water Management Challenges.....	4-5
Geosynthetic Solutions in the Water Sector.....	6-9
Flood Alleviation Schemes.....	10-13
Storage Reservoirs & Structural Drainage.....	14-17
Open-air Reservoirs & Snow Ponds.....	18-21
Coastal Protection.....	22-25
Green Slopes & Earth Retaining Walls.....	26-29
Design Solutions.....	30-31





## • Water Management Challenges

**Flooding is a natural process that is exacerbated by the effects of climate change and the increasing urbanisation of our green spaces. It is a major problem in many regions, posing a risk to health, safety and wellbeing.**

The Met Office predicts that by 2070, winters in the UK will be up to 30% wetter than they were in 1990 and that rainfall will be up to 25% more intense.

Groundwater is increasingly saturated following persistent winter rainfall with rivers, streams and drainage systems reaching their limit. Water gathers and the natural boundaries, for example embankments, can no longer retain the water, resulting in the banks overflowing.

Although summers are overall becoming drier, with more heatwaves and spells of drought, rainfall events are becoming heavier and are already 20% more intense than in 1990.

Intense downpours of more than 30mm of rain in an hour are expected to occur twice as often, meaning surface water and flash flooding such as that which hit London in 2021 is becoming more prevalent.

In warmer climates and regions, water management challenges are concerned with preventing excess losses of water from reservoirs and storage basins.

It is evident that with extreme weather patterns occurring more frequently, the need to manage flood risk is crucial and both natural and man-made structures must be better protected against damage.

## ● How geosynthetics can help

**ABG's civil engineering and water sector management team have many year's of collective experience, implementing geosynthetic based solutions for flood alleviation schemes, reservoir embankments, storage basin lining and retaining wall structures.**

Today's water sector and environmental management engineers are also mindful of specifying value engineered and carbon saving alternatives. For example by replacing deep granular drainage stone layers with light-weight and easy to install geocomposites.

In flood alleviation schemes our geogrid, turf reinforcement matting and geocellular based designs help to reinforce and stabilise embankment and flood relief structures and surfaces, often without the need for importing new fill material which greatly reduces the project's overall carbon footprint.

For basin and open-air reservoir construction projects, geosynthetics are installed to reinforce steep sided slopes, in addition to basal geomembrane linings, anti-floatation and leak detection drainage layers.

For covered service reservoir buildings, our structural drainage layers are designed to provide efficient management of rainfall to protect the waterproofing and support the successful establishment of grass coverage.

Geosynthetics also play an important role in coastal resilience and protection projects, with reinforcement matting used to provide erosion control to cliff faces and geotextiles used to provide filtration and separation on beach and dune stabilisation schemes.

Ports and reservoirs require a range of retaining walls and embankments and ABG specialises in the design of vegetated steep slope systems utilising our range of geogrids and geocells as a cost effective and sustainable alternative to stone / gabion and concrete crib wall designs.

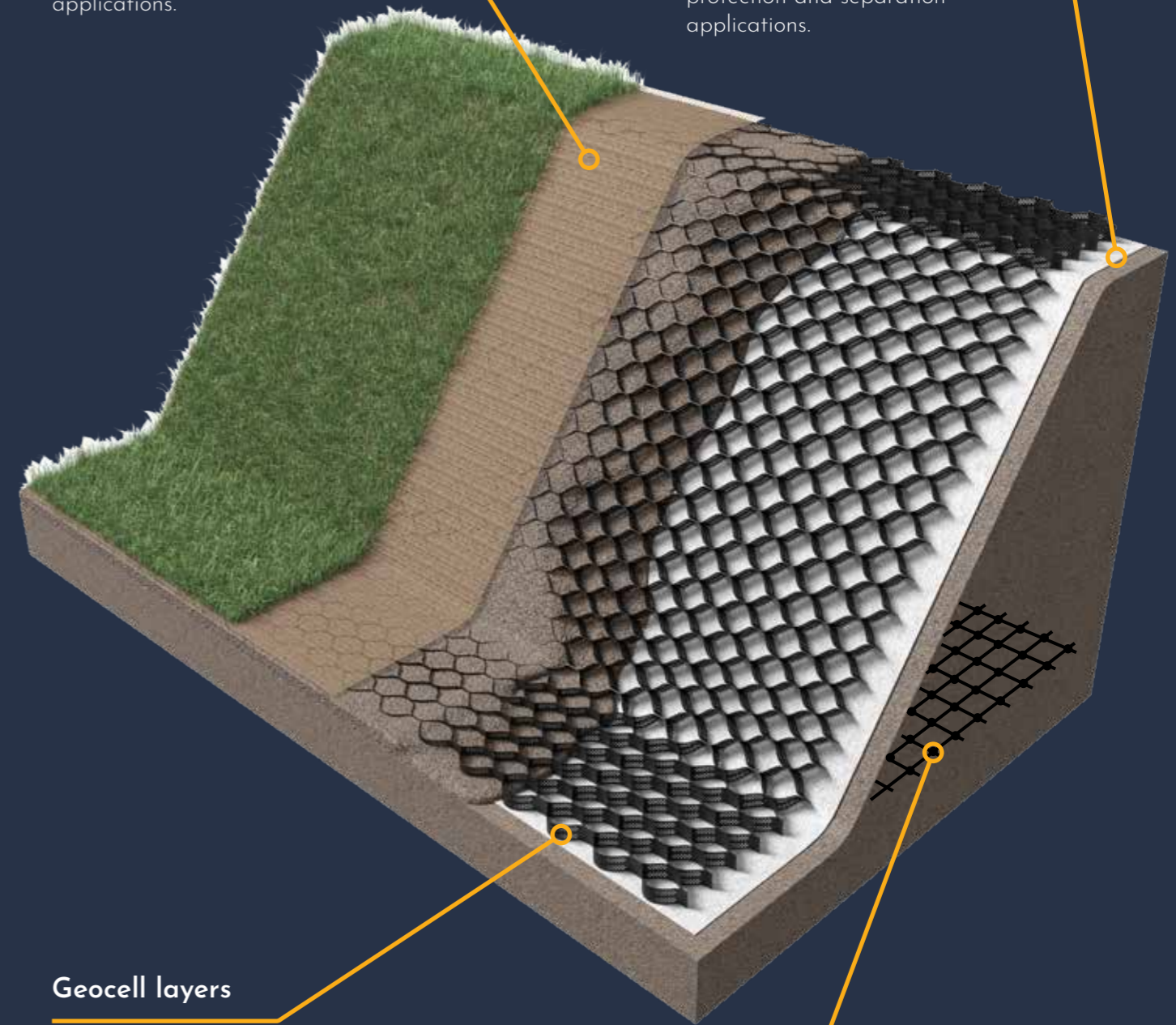


### Turf Reinforcement

Biodegradable / temporary coir matting and permanent HDPE reinforcement layers available to provide additional support to grass for flood embankment protection applications.

### Geotextile layers

A wide range of high permeability geotextile options for filtration, protection and separation applications.



### Geocell layers

Erosaweb panels secured to effectively drain and retain weak soils / fill for steep embankment erosion control applications.

### Geogrids

Available in a range of different strengths and both biaxial and triaxial options to reinforce and stabilise soils in steep embankment applications.

## • Geosynthetics Manufacturing

ABG are specialist manufacturers of geosynthetics for use in civil engineering and environmental applications. Our Water Sector solutions encompass:

- Geocomposite options consisting of a combination of filter geotextiles and cusped drainage cores
- Basal stabilisation designs for the protection of water storage structures
- Anti-erosion products and many other specialist geotextile and geomembrane components
- Integrated technical support; from detailed design to project installation guidance

### Typical applications:

- Flood Alleviation Schemes
- Slope Stabilisation
- Open-air Reservoirs
- Snow Ponds
- Storage Reservoirs
- Coastal Protection



## • Water Sector Solutions

Our product range delivers the key functions required for water engineering schemes:

- Robustness to withstand installation and service life
- Superior drainage
- Erosion control and stability solutions for steep slopes
- Excellent puncture resistance to protect geomembrane linings
- UV resistance for the period before the product is covered
- Ground water pressure relief to prevent floatation
- De-gassing layers



## ● Flood Alleviation Schemes

**A range of products and design support for the creation, repair and reinforcement of flood embankments and storage areas to provide enhanced erosion protection.**

The main challenge for flood protection schemes is often to maintain grass coverage onto embankments and spillways during periods of over-topping and rising flood water levels.

Grass is a good short-term erosion protection solution, however it suffers from potential weak areas due to die back or poor growth which can lead to washout and erosion. Therefore turf reinforcement matting is designed to support and enable successful grass growth.

Permanent and biodegradable erosion control products provide protection against high surface water flows and improve the structural stability of soils to promote vegetation growth.

For steep embankment sections geocellular panels are also available to provide additional soil retention.



## ● Flood Alleviation Schemes

**Erosamat Types 1 and 2** are a range of biodegradable and intermediate turf reinforcement matting. Jute and coir options consist of a dense mesh of fibres to absorb the impact of rainfall and reduce run-off velocity. The mat protects the soil until the vegetation has germinated and a root system is established.



**Erosamat Type 3** is a range of permanent turf reinforcement matting products for the protection of grass roots as they establish onto steep slopes and for specification in high flow velocity conditions. The sheet is made up of a thermally bonded matrix of polypropylene fibres that create a tough, flexible and long lasting erosion control mat. Erosamat Type 3 is coloured black for general use, but other colours can be manufactured on request, including green and brown.



## ● Project Story

The Aller Moor spillway is situated between the rivers Parrett and Sowy in the Somerset Levels. The site is around three metres above sea level and is prone to flooding from both fresh water and occasional salt water inundations. The River Parrett is 3-4 metres above the River Sowy and in flood conditions the Parrett overtops both its embankments and flows quickly into the Sowy over a grassy bank, resulting in severe erosion.

The challenge was to design a spillway that would withstand prolonged high velocity flood water flows. In line with Environment Agency policy, a natural vegetated appearance is preferred, avoiding concrete or hard armour options where possible.

Following the re-profiling of the river bank and spillway, it was determined that a Turf Reinforcement Mat (TRM) system was required to withstand specified hydraulic loadings during flood events.

Erosamat Type 3/20Z 500M was selected for this rigorous application to provide a permanent and effective surface erosion control and vegetative root reinforcement layer capable of hydraulic loadings in excess of 6 m/s.

**Product:**  
Erosamat Type 3

**Project:**  
Aller Moor,  
Somerset Levels

**Quantity:**  
21,500m<sup>2</sup>

## ● Storage Reservoirs & Structural Drainage

An extensive range of options are available for incorporation on, around, and under buried concrete structures; including covered reservoir roof and wall drainage and groundwater drainage applications.

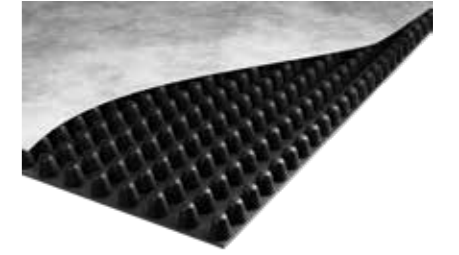
Deckdrain® geocomposite product options provide drainage of external water pressure to protect utilities and infrastructure projects, including service reservoir roofs and dockside loading areas.

### Geosynthetic product benefits include:

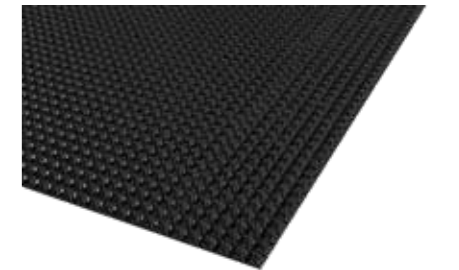
- Reduced weight and thickness of drainage layers when compared to traditional aggregate drainage stone methods
- Reduced traffic volumes to site when compared with stone, meaning reduced carbon footprint and fewer vehicle movements
- Reduced dead loads on the structure meaning thinner slabs are possible
- Wide roll widths suitable for rapid installation, reducing construction time
- Enhanced performance of structural waterproofing by providing an additional barrier that prevents the majority of the water reaching the liner
- High CBR puncture resistance

## ● Structural Drainage Products

Deckdrain® and Roofdrain® geocomposite layers can be utilised for structural drainage applications, available with different thicknesses and geotextile options to suit the loading conditions. Also available with additional UV protection for applications in hot climates and installation situations where the geotextile will remain exposed for longer periods.



Leakdrain drainage composite available to provide a leak detection layer between multiple linings within storage basin containment structures.





# Project Story

The original Stillorgan open reservoir site was in service for over 150 years before it was modernised into a new covered facility as part of a €50M investment by Water Ireland.

The new reservoir stores some 160 million litres of treated water, serving over 200,000 people in south Dublin. The new storage reservoir roof covers a vast 31,000m<sup>2</sup> area and required a drainage solution beneath the soil and turf surface layers.

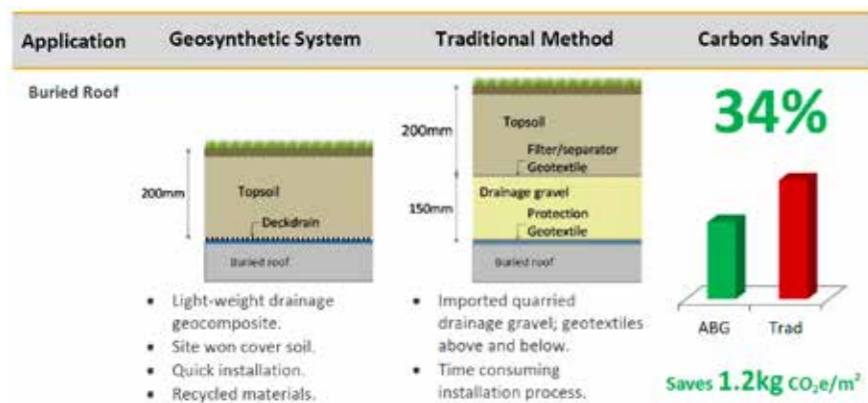
Reservoir roof construction traditionally utilises a protection board against the waterproofing layer, before backfilling with no fines drainage stone. An aggregate drainage layer would involve the delivery of large volumes of carbon intensive crushed stone, plus additional weight loadings being placed onto the structure.

Deckdrain<sup>®</sup> was installed as a light-weight, carbon saving alternative to a 15cm stone layer. The upper filtration textile layer allows water to seep through without clogging and to collect into the cusped drainage core. This connects into the surrounding reservoir to prevent rainwater from waterlogging the roof and damaging the waterproof lining.

**Product:**  
Deckdrain

**Project:**  
Stillorgan Storage Reservoir, Dublin

**Quantity:**  
31,000m<sup>2</sup>



## ● Open-air Reservoirs & Snow Ponds

ABG has developed a wide range of geocomposite drainage products, erosion control mats, geocellular confinement systems, geogrids and geotextiles for use in the construction of ponds and reservoir basins:

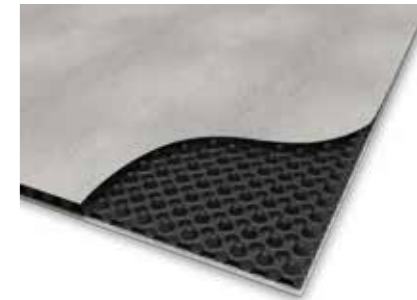
- Terrex reinforcement geotextiles to improve the stability of excavations in land with poor load bearing qualities
- Drainage of the base can be executed quickly with Pozidrain®, made of a cusped core bonded to nonwoven geotextiles
- Ponds and reservoirs often involve groundwater flowing beneath the liner that creates an uplift or floating of the lining system that is detrimental to the serviceability of the pond. This pressure can be effectively relieved using geocomposite drainage layers
  - Gases arising from groundwater pressure can be alleviated using Pozidrain®
  - A range of puncture-resistant, needle-punched nonwovens available for protection of the geomembrane liner
  - HDPE geomembrane liners to provide a heat-sealable product, allowing quality control of sealing

## ● Basin Construction Solutions

**Terrex SNW** provides a highly deformable, thick, puncture resistant needle-punched nonwoven geotextile for protection of the geomembrane liner.



**Pozidrain®** is the all-in-one waterproofing, drainage and gas venting solution, providing a sustainable, environmental alternative to traditional filter stone drainage layers. Pozidrain is used extensively to remove water, liquids and gas quickly and efficiently from basal areas.



**HDPE geomembranes** are engineered to provide liquid and gas containment barriers for a wide range of reservoir lining applications. The geomembrane is manufactured from high quality virgin HDPE and heat-sealable to achieve secure welded seams.



## • Project Story

As part of a project to upgrade ski facilities and to provide more consistent piste conditions in increasingly unpredictable winter weather, Funivie Seggiovie San Martino Spa commissioned the design of a new water basin for the production of artificial snow at the San Martino di Castrozza resort, high in the Italian Alps.

Construction of a basin high on a mountainside meant that groundwater flowing beneath the liner would create an increase in hydrostatic pressure. This could, especially in times when the basin was not full, cause uplift or floating of the lining system that would be detrimental to the serviceability and longevity of the pond. A reliable, low cost and easy to install drainage method was sought to remove this groundwater pressure beneath the liner.

Pozidrain was installed as a double function groundwater drainage and de-gassing layer. It was chosen to provide a thin and effective water pressure relief membrane, having a flow capacity sufficient to cope with the groundwater conditions expected locally.

**Product:**  
Pozidrain

**Project:**  
San Martino di Castrozza,  
Snow Pond

**Quantity:**  
31,000m<sup>2</sup>



## Coastal Protection Geosynthetics

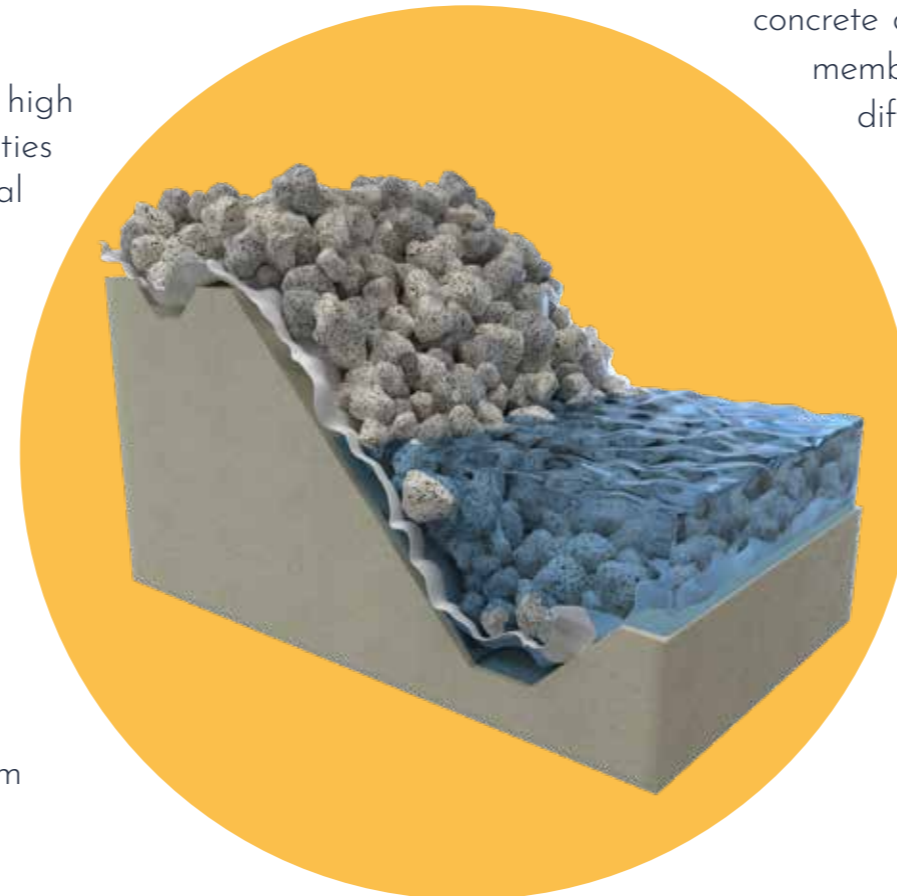
Geotextiles are often used in combination with rip-rap, also known as armour stone, to provide an additional layer of protection and to help stabilise the structure.

Filtration geotextiles are designed to be used as separators for hydraulic coastal and river defence structures.

They are placed at lower permeability depths to prevent the escape of fine particles, whilst permitting the free passage of water to provide a stable and consistent bedding layer and can often replace the need for rock armour altogether.

Fine pore size and high permeability properties make our coastal geotextiles the ideal choice for demanding filtration applications within coastal engineering.

Erosamat reinforcement matting is also used in coastal areas to help protect and re-establish vegetation to cliff faces following storm damage and land slips.



## Coastal Protection Geosynthetics

Terrex CG is specially engineered to provide exceptional performance in separation, filtration and protection - whilst maintaining reduced thickness compared to traditional geotextiles. These geotextiles offer benefits in coastal protection beneath rip-rap and concrete defences, and can also be used for the protection of impermeable membranes. The range is available in either black or white and in five different weights to suit the specific loading applications.



## ● Project Story

French electricity producer EDF has constructed a new LNG-terminal in Dunkirk to deliver an additional 13 billion m<sup>3</sup> of natural gas capacity per year. As a result, the facility makes an important contribution to the security of the natural gas market in northwest Europe.

In order to protect the inner port from wave erosion, rock armour was installed to provide protection.

The design called for a geotextile filter underneath the rip-rap that would withstand the wave conditions and placement of the armour stone.

In total, 250,000 m<sup>2</sup> of Terrex CG nonwoven geotextile filter was supplied during the project.

The nonwoven geotextiles selected for this project deliver an optimal combination of strength and elongation, with added excellent hydraulic characteristics. This results in a high energy index, allowing absorption of possible installation damage.

**Product:**  
Terrex CG

**Project:**  
LNG Terminal, Dunkirk

**Quantity:**  
250,000m<sup>2</sup>



## ● Green Slopes & Earth Retaining Walls

A range of products to create reinforced earth retaining walls with a green / vegetated surface to suit the desired aesthetics of the project. Face angles ranging from 26° to 70° can be achieved with a design life from 60 years up to 120 years.

Revegetation requires retention of the soils either by installing geocells or using anti-runoff turf reinforcement, or sometimes using the two layers combined.

Our range of options for revegetation include the Erosamat Type 1 coir matting and Erosamat Type 3 permanent matting options.

For the reinforcement of earth embankments a range of geogrid options and geocellular slope systems are available. Our systems include the Abslope SM steel mesh facing panel system for slopes upto 70° and the Abslope EM system with geogrid reinforcement layers for the construction of slopes up to 45°.

Woven polyester or polypropylene reinforcing sheets (with a high-modulus of deformation) make an efficient and economical soil reinforcement solution. They enable the construction of soil-geotextile sandwiches in earth retaining wall applications.

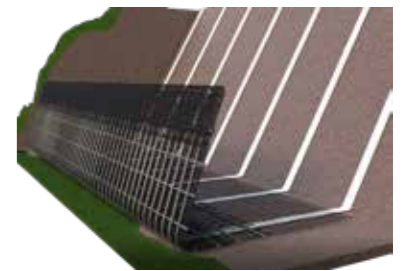


## ● Green Slopes System Solution

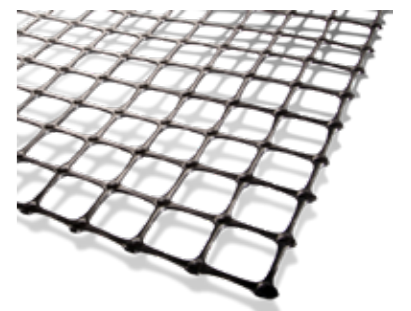
**Erosaweb®** geocell is designed for the reinforcement of weak soils and has many applications, including retention of soils on steep slopes and highway and rail embankments. The cells of the geocell retain the fill material, while allowing water through.



**Abslope** is a geogrid reinforced slope system available with erosion control matting surface (EM system) for slopes upto 45° and with steel mesh facing (SM system) for the construction of slopes up to 75°.



Biaxial geogrids available for use in a wide range of ground stabilisation situations. The combination of ribs and the corresponding nodes within the geogrids allows loads to be transferred into the geogrid structure, whilst allowing a positive interlock of the reinforced materials through the apertures of the geogrid.



**Gridtex** is a high performance woven geotextile, engineered for reinforcement applications and suitable for strengthening a wide range of materials. It is capable of fulfilling many of the functions required of a geogrid, whilst at the same time offering all the benefits of a woven geotextile.



## ● Project Story

Magna Park provides a high-quality business park environment specifically focused on logistics and distribution. Covering over 550 acres it is the first choice for logistics due to its strategic position in the centre of the country.

The Abslope reinforced earth system with geogrid reinforcement provided an economical and structurally flexible sustainable retaining structure used around the perimeter of the development.

The system consists of reinforcement geogrid layers installed throughout the slope to construct a face angle of 45°. The slope is then lined with a vegetation liner to assist establishment of a grassed face.

Grass seed is added to the slope face (hydroseeding) to create an attractive and natural looking vegetated surface that blends in with the surrounding landscape and protects against erosion.

**Product:**  
Abslope EM

**Project:**  
Magna Park, Leicestershire

**Quantity:**  
2,000m<sup>2</sup>



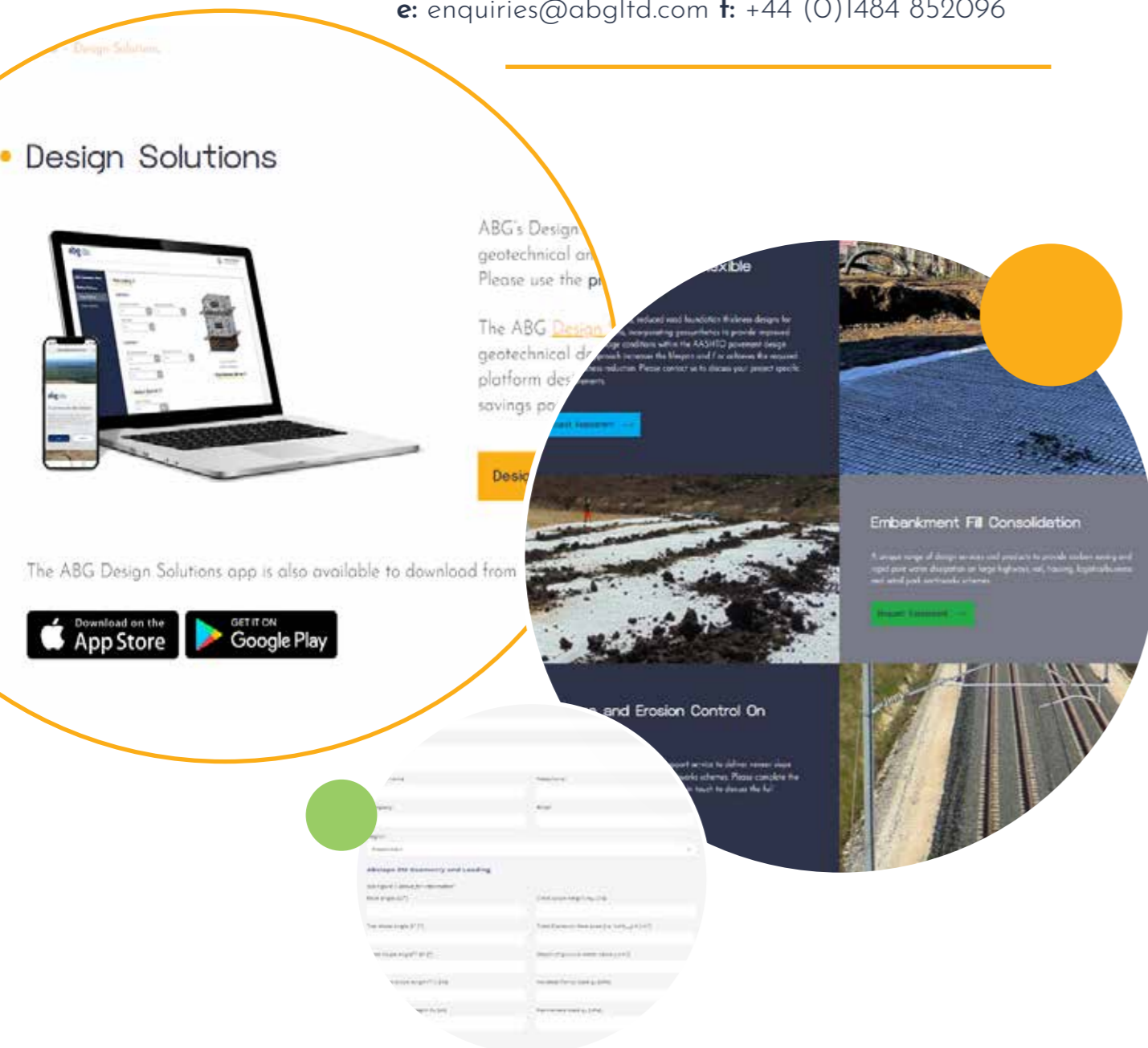
# • Design Solutions

Our experienced engineering department is on hand to assist with your water management project requirements.

A range of project assessment forms are now also available on our website to assist with your project design @ [www.abg-geosynthetics.com/design-solutions](http://www.abg-geosynthetics.com/design-solutions)

Contact the ABG engineering team for design and application advice:

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