




Sustainable Drainage

A guide to the application of geosynthetics in the design of SuDS systems



The increasing need for SuDS

In addition to the ever increasing need to minimise the catastrophic impact of extreme flooding events, a much more sustainable approach to how we manage surface water is necessary in order to create a more balanced and natural ecology in both our urban and rural areas.

By embracing the core principles of SuDS, we will help to minimise the impact of flooding whilst also facilitating a much more attractive and sustainable landscape in which we work and live.

This new strategy to manage our surface water more effectively and minimise the risk of flooding is based upon implementing the following measures:

- Installing sustainable drainage systems on new and existing development.
- Use of forestry and land management to hold back water in the upper reaches of rivers, as well as dredging for the lower reaches.
- Buildings and land that cannot be properly protected to be made to withstand flooding.
- All new housing on flood plains must be resilient when built.
- More co-operation between experts, the water companies, internal drainage boards, local authorities, the Environment Agency, SEPA and Natural Resources Wales

Historically, new development has involved the construction of large areas of impermeable surfaces creating heavily polluted stormwater run-off which has been drained into our already overloaded and decaying sewerage systems. This total disregard

for source control, and in particular natural infiltration, has significantly contributed to the ongoing problems of extreme flooding whilst also causing extensive river pollution and limiting groundwater recharge.

A much more creative and sustainable approach is necessary involving the design of innovative hybrid (both above and below ground) SuDS solutions where our stormwater is effectively managed and when viable utilised as a valuable natural resource. SuDS source control techniques such as porous paving and green/blue roofs play a significant role in reducing flood risk by managing our stormwater naturally and alleviating the burden on our existing failing drainage infrastructure.

In addition to incorporating SuDS into all new development, the greatest challenge is the clear need to retrofit SuDS within existing development. This is essential if we are to achieve our objectives of effective flood risk management and water quality, as well as using water as a resource to improve the environment, promote biodiversity and adapt to ongoing climate change.

The advantages of geosynthetics in SuDS

For more than 50 years, geosynthetics have been used extensively throughout the world helping deliver innovative, technically assured and cost-effective solutions across an increasingly diverse range of civil engineering problems. Their use offers many advantages over 'traditional' construction techniques helping deliver sustainable solutions.

Geosynthetics continue to be used as the standard method of optimising the structural load carrying capacity of paved areas, leading to improved pavement performance, water treatment, reduced costs and increased longevity.

As a consequence, both the structural and stormwater treatment benefits of geosynthetics have been recognised and universally adopted in the development of a comprehensive range of SuDS solutions that deliver source control - both above and below ground.

All the stakeholders in any new development have a collective duty of care to deliver a CDM compliant solution and one of the primary benefits of incorporating geosynthetics is that a more sustainable

shallow solution can be achieved which minimises both the risk and cost of construction.

This reduced depth of construction also limits the use of natural materials and off-site disposal which optimises the environmental credentials of a project.

Another prime benefit in the use of geosynthetics is their ability to enhance the water treatment capability of a SuDS system. Source control solutions rely upon a series of treatment stages in order to achieve an acceptable quality of discharge water and geotextiles and geocomposites in particular have an important role to play in achieving this increasingly onerous requirement.

In addition, geotextiles, geomembranes, geocomposites and erosion control mats (ECMs) are essential components for the installation, protection and continuing function of the increasingly diverse range of infiltration and attenuation systems.

Hence, the role of geosynthetics is fundamental in delivering good urban design which embraces 'garden city' principles to deal with the ever increasing challenges of flooding through building resilient high quality, well designed places - providing space for sustainable drainage, green infrastructure and enhanced biodiversity without adding additional costs to development.

Porous paving systems

The benefits of geosynthetics to the construction of porous pavings are well documented allowing pavements to be constructed using less imported stone, improving water quality by their filtration and allowing pavements to be used for the infiltration/attenuation of collected surface water.

Where porous pavings is not permitted drainage geocomposites can provide effective conveyance of collected surface water to other elements of the SuDS system.

Trench soakaway systems

Geotextiles have long been an integral element of soakaway systems providing a vital treatment process as collected water is filtered through the fabric

Underground geocellular tanks

Geosynthetics are integral element of geocellular tanking systems; geotextiles can form a highly efficient filtration material in infiltration systems whilst geomembranes make effective tanking systems where attenuation is required

Swales and channels

Geosynthetics can contribute to the construction of efficient swales and conveyance channels by providing resilient protection from damage caused by erosion.

Steep banks on swales can be constructed using geosynthetics reducing the land take required and releasing valuable space for development.

Green and blue roofs/podium decks

Geosynthetics are an integral element of green and blue roof construction allowing the build to be thinner and lighter whilst maintaining building performance. The use of geosynthetics contributes to the drainage and storage capacity whilst having a positive impact on quality of water discharged from the roof.

Ponds and basins

Geosynthetics provide a convenient method for the effective lining of SuDS retention ponds and basins. Where suitable steep banks can be constructed using geosynthetics making land available for development.



ABG Geosynthetics in SuDS

SuDSpave

A system of complementary components that create an integrated porous paving system to effectively manage the safe collection, treatment, management and dispersal of surface water.

The SuDSpave system is configurable to individual project requirements and offers a range of surface solutions to meet the aesthetic and performance requirements. A range of geogrids and geocells can minimise construction depth whilst meeting the structural requirements. In addition high performance geotextiles help treat collected water to meet quality expectations. Finally geocomposites can allow the formation of a free storage void across the paved area to attenuate surface water during storm events.



Green and Blue Roofs

ABG green and blue roofs (constructions that have the ability to attenuate collected water within the roof/podium deck structure) have been used extensively across many leading sustainable developments across the UK. Offered as full turnkey solution including PI covered design through to installation and on-going maintenance they provide an integral element of any holistic SuDS solution.

As with SuDSpave the final design of the system is dependent on the project specific requirements with a number of final surface finishes available including extensive, intensive and biodiverse vegetation along with paved finishes.

The drainage/storage capacity is also project specific to meet the requirements of the SUDS design.



Erosion Control Systems

ABG offer a broad range of erosion control products that includes biodegradable and non-biodegradable erosion control mats. They can help with the surface protection of many elements within the SuDS scheme including swales, channels, ponds and attenuation basins.

Silt laden run-off from exposed soil slopes is a major concern for the Environment Agency who consider it a pollutant; erosion control systems help ensure the environment is protected throughout the life of the project from construction to establishment of the vegetation.

As with all ABG products design advice on which materials are best for your specific requirement and their specification is available from the in-house technical department.



Webwall

Webwall is a geosynthetic system designed for the construction of flexible retaining walls. It uses a geocellular mattress which is laid in layers with each expanded and filled with site won materials to form a structure with a vegetated face.

The Webwall system offers a solution in many SuDS applications with its primary use being in the construction of steep embankments on SuDS structures such as swales, channels and attenuation basins and ponds. Constructing steeper embankments minimises the land take of the structure freeing up more land for development.

As with all ABG systems a full design service is offered through our in-house team of chartered civil engineers.



Drainage Systems

ABG drainage geocomposites offer high performance cost effective alternatives to traditional stone groundwater drainage solutions and have been used extensively in a wide range of civil engineering, environmental and building drainage applications.

Drainage geocomposites offer very high flow capacity, many times that of traditional crushed stone (specific data is available), this is achieved through the unique open structure created by the cusped construction which allows unhindered water flow through the core.

Geotextiles ensure that fines do not enter the flow void minimising the occurrence of blockages and allowing continuity of flow through the whole life of the installation.



Reinforcement, Separation and Filtration

A complete range of high performance geogrids and geotextiles for use in many SuDS engineering applications. The geogrid range comprises both uniaxial and biaxial configurations and are suitable for use in many applications including the construction of reinforced earth systems and the strengthening and reinforcement of weak sub soils allowing the construction of thinner pavements.

Both woven and non-woven geotextiles are available in a wide range of weights and are suitable for many applications including reinforcement and filtration applications. In filtration applications the properties of the geotextile can contribute significantly to the removal of pollutants of water passing through greatly improving water quality.



About ABG

ABG is a market leader in the design, development, manufacture and technical support of high performance geosynthetic systems for use in a wide range of civil engineering, environmental and building projects.

Formed in 1988, based in Meltham, in the heart of the Pennines, ABG have developed an excellent reputation for developing quality products and delivering outstanding service. The ability for rapid product development ensures that the most innovative, up to date and cost effective solution can be found for many engineering problems.

ABG's involvement in creating sustainable drainage systems goes back over twenty five years and we have wide engineering expertise coupled with a complete range of geosynthetic products developed specifically for use in this technically demanding application.

Technical support is provided by our trained and experienced staff, many of whom are Chartered Civil Engineers. This extensive support extends to full design, design validation, feasibility studies, cost advice and advice on meeting regulatory requirements.

Part of this technical support includes developing and driving knowledge within our active markets including working with both international and local regulatory bodies on developing guidance and best practice in the use of innovative geosynthetics to solve complex engineering issues.

A full installation and maintenance service for many ABG systems is available through our in-house installation business, Geogreen solutions.

For further information or to discuss your project specific requirements contact ABG:

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Additional ABG system information available

- **Porous Pavements:** *A guide to the selection and specification of ABG SuDSpave porous paving system*
- **Green Roofs:** *A guide to the design and specification of ABG Geosynthetics green roof systems*
- **Blue Roofs:** *A guide to the design and specification of ABG blue roof systems*
- **Erosion Control:** *A guide to the selection and specification of ABG erosion control systems*
- **Reinforcement and Separation:** *A guide the selection and specification of ABG geogrids and geotextiles*
- **Drainage Systems:** *A guide to the design and specification of ABG Filldrain drainage geocomposite*

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