

TECHNICAL INFORMATION

TOPMIX PERMEABLE

For surface and storm water management

Drainage capacity	150 to 1,000 litres minute per square metre
Void content	20-35%
Typical compressive strength	10-20Nmm ²
Flexural strength	1.5-3N/mm ²
6mm mix	Final aesthetic finish
10mm mix	Ground stabilisation underneath blocks

PROBLEMS WITH TRADITIONAL SURFACE WATER DRAINAGE SYSTEMS

SURFACE WATER FLOODING

The inability of our existing drainage systems to cope with changing weather conditions was brought sharply into focus by the unprecedented floods experienced across Great Britain in 2007 and highlighted again, more recently, by serious flooding in the winter of 2013/14.

The Environment Agency estimated that over two thirds of the 57,000 homes affected by the 2007 floods were not flooded by swollen rivers, but by water running off paving or overflowing from the overloaded drainage systems serving them.

The reason for this is simple. The majority of our existing drainage systems are designed to remove rainwater as quickly as possible from where it falls and direct it into watercourses or drains. This means in cases of prolonged, heavy rainfall the public sewer system quickly reaches its capacity and consequently overflows.

The continued expansion of the urban environment using impermeable materials, coupled with a growing trend for homeowners to replace lawns and gardens with hard landscaping is placing even more pressure on our aging sewage systems. The pressing need to build more homes to meet the demands of our growing population is only likely to make things worse.

POOR QUALITY WATER

Storm water can easily become contaminated by petrol, diesel, heavy metals, detergents and other pollutants while running down mixroads and pathways, before entering the drainage system. These are either drained straight into watercourses or have to be removed at treatment plants. This problem is exasperated in areas where combined sewers are in place, and places a significant burden on treatment works.

HIGH MAINTENANCE COSTS

Traditional drainage systems gather small objects, sediment and other pollutants. These are filtered out in gully pots, which need to be maintained and regularly emptied.

REDUCED GROUNDWATER LEVELS

Directing rainwater directly into watercourses or drains and sewers, results in natural aquifers being bypassed, reducing the level of the water table. This can lead to water shortages and result in natural streams and ponds drying up. A lack of groundwater can also affect the foundations of homes, particularly in areas with clay soils that shrink when they dry out.

INCREASED RISK OF CONTAMINATION

Combined sewers often have overflows, also called combined sewer outlets, through which excess water can drain into watercourses in order to protect properties from flooding. These can spill sewage into watercourses and therefore must be continuously monitored and licensed by the Environment Agency to ensure they only operate when the system is receiving excess rainfall.

LEGISLATION AND GUIDANCE

In recent years a range of legislation and guidelines have been published to help address the growing problem of surface water flooding through the implementation of sustainable drainage systems. These include:

THE PITT REVIEW 2008

Following widespread and serious flooding across many parts of the country in 2007, the government commissioned an independent review to be undertaken by Lord Pitt.

As a direct result of this, new guidance was introduced for the surfacing of front gardens in October 2008. This had two very important implications:

- Planning permission to pave a new or existing driveway of any size would not be required if a permeable (or porous) surface is used, or if the rainwater is directed to a lawn or border to drain naturally.
- Planning permission will be required to pave an area greater than 5m² impermeable surface.

THE FLOOD WATER MANAGEMENT ACT 2010

The Flood and Water Management Act addresses a number of key issues to counter and manage flooding, including four that were aimed specifically at SuDS:

- The requirement for developers to construct sustainable drainage systems for new developments and redevelopments with drainage implications
- Any construction work that has implications for drainage cannot commence until a SuDS plan has been approved at unitary, or county level by a SuDS Approving Body (SAB)
- Local authorities will become responsible for (adopting) the schemes and their maintenance once completed

- The Department for Environment, Food and Rural Affairs (Defra) is responsible for publishing National Standards for sustainable drainage. These points were included in Schedule 3 of the Act, which is currently timetabled to be implemented alongside the introduction of new National Standards by December 2014. The new standards will cover the design, planning approval, construction and maintenance of SuDS, including affordability and exemptions.

SCOTTISH LEGISLATION

Legislation in Scotland is more established than for England and Wales. The Water Environment and Water Services (WEWS) (Scotland) Act made Scottish Water responsible for SuDS and their specifications in 2003. This was followed by the Flood Risk Management Act 2009 and the Controlled Activities Regulations (CAR) 2011, which made the use of SuDS mandatory for surface water run-off in all new developments (excluding single dwellings). There are also two sets of guidelines covering the implementation of SuDS.

The first, Sewers for Scotland Second Edition, provides guidance on the design and construction of basins and ponds. The second, SuDS for Roads, provides guidance on the types and applicability of SuDS for roads at pre-treatment, source control and site control. Scottish Water is responsible for the future maintenance and capital replacement of shared public SuDS systems. The Roads Authority and Scottish Water share responsibility for the future maintenance of SuDS incorporated into new road construction.

BENEFITS OF SUSTAINABLE URBAN DRAINAGE SYSTEMS (SUDS)

SuDS have a number of very important advantages over traditional surface water systems:

EFFECTIVE MANAGEMENT OF WATER DRAINAGE

Being able to control and actively manage the drainage of rainwater from the developed landscape significantly reduces the risk of surface water flooding, protecting both the natural and built environment.

REDUCED PRESSURE ON EXISTING SYSTEMS

New systems can be incorporated into the redevelopment of the existing infrastructure, as well as installed in new housing and commercial and industrial developments, easing the pressure on overstretched drainage systems, sewers and water treatment plants.

IMPROVED WATER QUALITY

SuDS filter surface water as it is drained, improving water quality and reducing the cost of water treatment. Permeable pavements are particularly effective in this area with pollutants that infiltrate the surface being flushed into the underlying pavement layers where they are filtered and trapped or degrade over time.

REDUCED RISK OF WATER SHORTAGES

Directing rainwater into natural aquifers keeps them recharged, reducing the risk of water shortages during periods of low rainfall.

BETTER FOR PEOPLE AND THE ENVIRONMENT

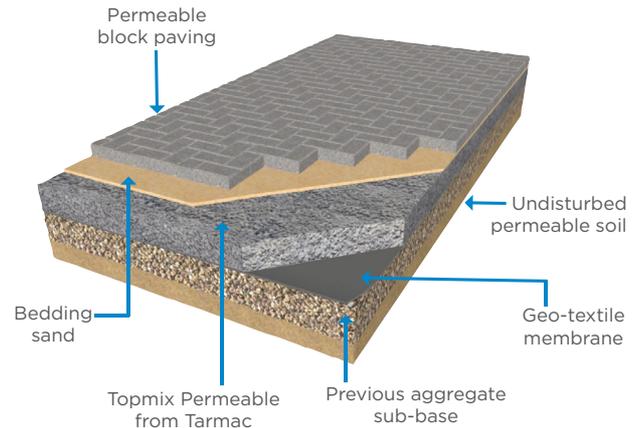
SuDS can be used to provide a constant supply of fresh water for lakes and pools and to create new water-based amenities, benefiting both local communities and wildlife.

INCREASED PROPERTY VALUES

Residential developments that incorporate a SuDS can attract higher values, particularly in areas where there is a high risk of flooding.

USING TARMAC'S TOPMIX PERMEABLE WITH PERMEABLE BLOCK PAVING

In block paving applications where the underlying soil is poor or the final solution will be subject to heavy loads, remediation works are sometimes required to improve the structural performance of the area. Hydraulically bound course graded aggregate and cement stabilised course graded aggregate are common specifications for this type of application. The minimum permeability rates required for each of these applications can be easily achieved, and exceeded, through the use of Tarmac's Topmix Permeable. (include image)



MAINTAINING OPTIMUM PERFORMANCE

Topmix Permeable from Tarmac is designed to remove a high percentage of Total Suspended Solids (TSS). To ensure the system continues functioning to its optimum efficiency a cleaning schedule should be put in place so that the voids in the concrete do not become blocked. Maintenance should be undertaken through hydro-pressure with suction cleaning. The surface can be swept with a road sweeper, however, sweeping should be kept to a minimum and not replace routine hydro cleaning as it can encourage fine particles into the surface. The frequency of maintenance will depend on the level of contamination and environmental factors such as proximity to trees, run-off from road works, building sites and dirt from car tyres. In general, annual maintenance is advised to maintain optimal permeability.

THE URBAN HEAT ISLAND (UHI) EFFECT

Materials like asphalt and traditional concrete contribute to the UHI effect - where urban areas are significantly warmer than surrounding rural areas. Due to voids within its structure, Topmix Permeable is less dense than conventional concrete and therefore has a reduced heat storage capacity. Additionally the voids allow stored water to evaporate in warmer weather creating a cooling effect. The UHI effect is a factor of solar reflectance or albedo, and is the percentage of solar energy reflected by a surface. Typically, this is between 35% and 40% for concrete, which is greater than dark asphalt (between 5% and 10%). The greater the reflectance the less energy absorbed and the smaller the contribution to the UHI effect.

IMPROVED WATER QUALITY

Permeable pavements are more effective in removing pollution from rainwater run-off than

attenuation tanks and can remove a wider range of pollutants than oil separators (CIRIA 2004). Initial larger particles are stopped at the surface reducing penetration to underlying sub-grades. Finer materials, hydrocarbons and heavy metals, whilst able to penetrate the top surface are trapped as they penetrate into the supporting layers. Organic materials, once trapped, breakdown over time reducing the amount and volume of contaminants that reach discharge watercourses. This makes permeable pavements ideal for areas where vehicles are stored or maintained. Research shows that permeable pavements can remove a high percentage of Total Suspended Solids (such as silt) and hydrocarbons. When subjected to low level oil drips, such as in car parks, permeable pavements can continue to biodegrade the hydrocarbons indefinitely. If additional treatment is needed for higher risk areas the use of natural SuDS, such as swales or wetlands, is recommended.

REUSE OF CONSTRUCTION MATERIALS

Concrete readily utilises recycled and secondary materials as constituents through the use of waste materials in the manufacturing of constituent and as replacements in concrete, this makes the concrete industry a net user of waste utilising 47 times more waste than it generates. Concrete is also 100% recyclable.

SUSTAINABILITY

The important role that SuDS have to play in improving the sustainability of the built environment is now recognised by levels of government, throughout the UK and across Europe. To comply with the European Water Framework directive, and gain certification from respected bodies such as LEED and BREEAM, new developments must have acceptable SuDS in place before planning permission is given. SuDS can take many forms, from soakaways, swales, retention basins and infiltration galleries used in conjunction with newer permeable pavement solutions such as Tarmac's Topmix Permeable. Advantages of porous pavements over other SuDS Porous or permeable pavements have many benefits over other systems when it comes to building in an urban environment:

- Provides a direct replacement for more traditional pavements
- Evacuate water faster than conventional drainage

- Provide a smooth, even surface for car parks, driveways and sporting areas
- Can remove pollutants from surface water before it is released into the watercourse or sewage system without the need for additional installations (depending on your application).

A PRODUCT OF OVER 100 YEARS' EXPERIENCE

Tarmac has a long and proven history of producing innovative, sustainable products and solutions that deliver consistent and outstanding performance. As a company we are committed to becoming our customers' preferred choice for sustainable construction solutions, by continuously improving social, economic and environmental standards, and offering quality products and services that contribute positively to the sustainability of the built environment.

RESPONSIBLE SOURCING

All of our production sites and products have been accredited to BES 6001*independent third party accreditation scheme that assesses responsible sourcing policies and practices across the supply chain. We have achieved a 'Very Good' rating which demonstrates our proactive responsible management of the environmental, social and economic impacts of our business throughout our supply chain; including the materials we buy, our operations, the way we produce materials and how we transport them to our customers. We also have 5* accreditation in the Achilles BuildingConfidence scheme.

TARMAC 2020 SUSTAINABILITY STRATEGY

We are making real carbon reductions and are committed to doing so on an ongoing basis. This is reinforced by our 2020 commitments to accelerate the move to a sustainable, low carbon economy. For more information visit www.tarmac.com/sustainability

ENVIRONMENTAL AND QUALITY MANAGEMENT SYSTEMS

We use management systems certified to ISO 9001, ISO 14001 and OHSAS 18001 across our operations to continuously improve social, economic and environmental performance. † References to BREEAM have been made in line with the 2011 New Construction Technical Guide.

*Our BES 6001 certificate number is BES 559207.

SUSTAINABILITY BENEFITS OF TOPMIX PERMEABLE FROM TARMAC

- Responsibly sourced in line with BES 6001*
- Conforms to BREEAM† and LEED standards
- Supports water capture systems for grey water recycling
- Filtration reduces water pollution and reduces the cost of treatment
- Contributes to the natural recharge of groundwater
- Reduces heat build-up and retention, reducing the UHI effect.

For more details contact

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The information given in this technical data sheet is based on our current knowledge and is intended to provide general notes on our products and their uses. Tarmac endeavour to ensure that the information given is accurate, but accept no liability for its use or its suitability for particular application because of the product being used by the third party without our supervision. Any existing intellectual property right must be observed.