

# PLASPAVE PERMI.8 LAYING GUIDE

including RAIN GARDEN DESIGN and methods of PERMEABLE CONSTRUCTION



As a responsible manufacturer PLASMOR has **SUSTAINABILITY** and **ENVIRONMENTAL PROTECTION** at the core of our business ethos. In the pages that follow we explain how the **PLASPAVE PERMI-8** range of **FIVE PERMEABLE LANDSCAPE PRODUCTS** enables you to embrace the SuDS philosophy, satisfy the regulations and create **VISUALLY APPEALING**, long lasting and **SUSTAINABLE LANDSCAPING PROJECTS**.





# Plaspave Permeable Paving

FOR THE SUSTAINABLE APPROACH

Increased urbanisation and construction has resulted in the proliferation of impermeable roads, driveways, car parks and pedestrian schemes and has increased the likelihood of surface water flooding. It is widely acknowledged there are inadequacies in our conventional and often old fashioned urban storm water drainage systems. These can be overwhelmed by heavy, prolonged rainfalls and subsequent rainwater run off resulting in flooding. The consequent urban disruption, environmental damage and cost will continue to increase if no action is taken to mitigate flood risks.

The UK Government has introduced a requirement for Sustainable Urban Drainage Systems (SuDS), a design philosophy which uses a range of techniques to manage surface water by attenuation and filtration. The latest Government requirements for SuDS on developments in England came into force in April 2015 and are being implemented through the planning system.

## reducing flood risks, enhancing water quality and helping the environment

The Government's expectation is "that Sustainable Drainage Systems will be provided in new developments wherever this is appropriate". The new measures are to be applied by local planning authorities on "major developments" of ten or more dwellings and equivalent non-residential or mixed sites. Smaller developments may consider the adoption of SuDS.

Sorrento Permi.8 CARRARA STONE

## CHOICE OF TWO SYSTEMS PERMEABLE OR CONVENTIONAL:

### THE MATERIAL DIFFERENCES



#### CONVENTIONAL block paving

CONVENTIONAL PAVED surfaces use a sub-base material called hardcore or MOT Type 1 material which once compacted stops water passing through it easily. **Wherever it is possible to provide rainwater run off**

from a driveway into a soak away or onto a rain garden contained within the boundary of a property then Conventional Block Paving may still be used without the need for planning permission.

The comprehensive range of Plaspave landscaping products remain suitable for these applications.

*N.B. If a conventional impermeable surface is required and run off onto the road cannot be controlled then a planning application will be required which will incur additional costs and may or may not be granted.*



#### PERMEABLE block paving

PERMEABLE paving surfaces require a different sub-base material that allows water to pass through and also store the water until it can eventually be dissipated by various methods. **If rainwater**

run off cannot be controlled, Permeable Block Paving can be used to construct an appropriate permeable paving system.

The sub-base aggregates are 4mm-20mm MOT Type 3 sub-base, crushed, clean and open graded pieces of stone that have spaces between to store water. The laying course and joint filling material is 2mm-6mm angular, crushed, clean gravel as conventional jointing sand is not suitable as a medium for surface water to pass through the paving systems. The Plaspave Permi-8 range of permeable landscaping products provides a comprehensive product choice for these applications.

### Method 1

**SURFACE WATER** from conventional block paved driveways can be directed onto a border, rain garden, lawn or a soakaway. This is achieved by creating an average slope or fall of 50mm towards the rain garden chosen rather than using traditional gullies and drains leading to sewers. The driveway should be sloped away from the house and rain gardens and soakaways positioned at least 3 metres distance from buildings.

## Conventional Block Paving and Rain Gardens

**Rain gardens** are created by forming a depression to allow the collected water enough time to soak into the subgrade. Rain gardens with appropriate planting offer the extra benefit of attractive and robust green spaces. Complimentary gravel or cobbles can be used as decorative features around the plants to reduce the evaporation of water.

Rain gardens should not have mulch on the surface as this will float when water collects on it. Where ground conditions demand, such as in clay soils,



rain gardens can have stone filled trenches below them to increase the storage capacity and allow water to soak into the ground more easily.

**Soakaways** are a similar idea except that water is piped into an underground chamber or gravel filled trench and allowed to soak into the ground. Soakaways can be located along the edges of conventional block paved driveways or beneath the garden area adjoining. Water is collected here and allowed to soak into the subgrade. On clay soils, it may be necessary to connect to the house roof water drain. The aggregate used for the soakaway must have open voids in it and no fine material. Water should flow freely into it. There is also potential to direct water from rain gardens to the urban drainage system (permission may be required) or to rainwater harvesting for re-use. As a rule of thumb, a pipe will be required if it takes a water filled 300mm x 300mm x 300mm pit more than 11 hours to empty.

*Please note - Water should never be directed to a neighbours garden or property*

### Method 2

Infiltration paving systems using **PERMI.8 CONCRETE BLOCK PAVING** are a supremely effective drainage system used in conjunction with permeable sub-bases and sub-grades. The individual permeable concrete blocks employ larger and non-conventional spacer nibs on the sides of individual blocks so that the surface water infiltrates through to the layers below.

## Permeable Block Paving and Total Infiltration

JOINTING MATERIAL  
2mm-6mm crushed  
angular gravel/rock

Plaspave Permi-8  
60mm or 80mm  
Block Paving

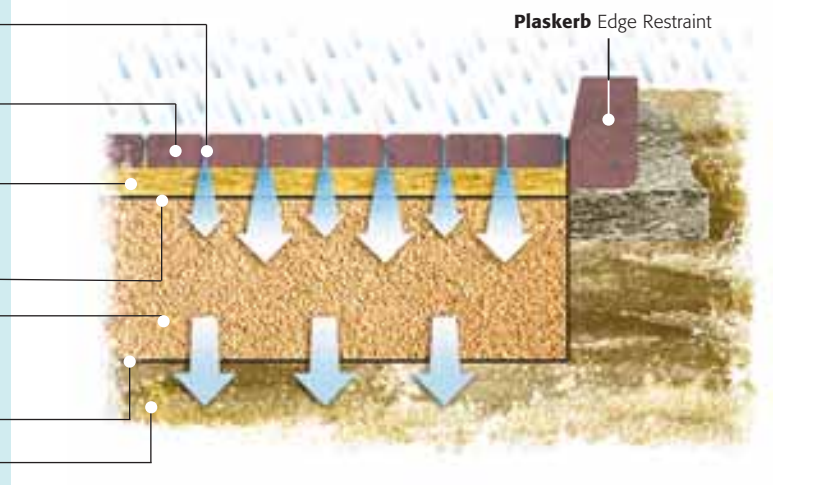
50mm AGGREGATE  
BEDDING COURSE  
2mm-6mm crushed  
angular gravel/rock

UPPER GEOTEXTILE

PERMEABLE COURSE  
4mm-20mm crushed course  
graded aggregate depth  
determined by design

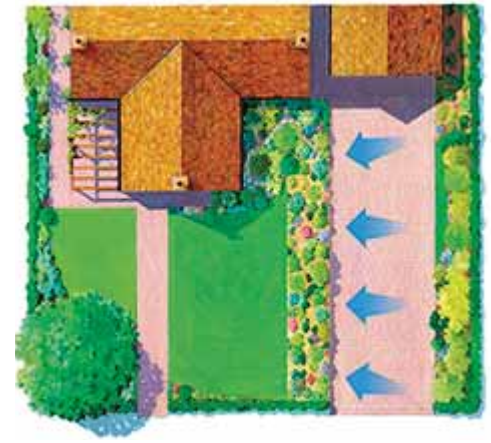
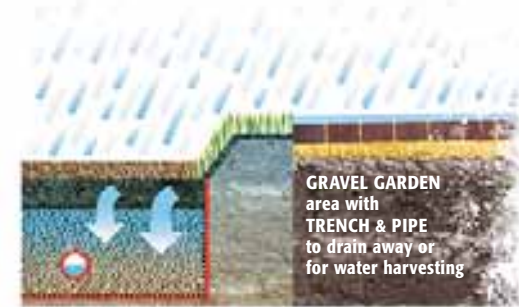
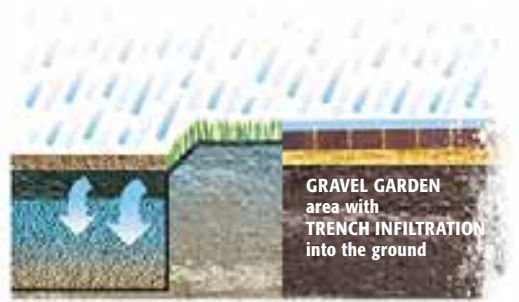
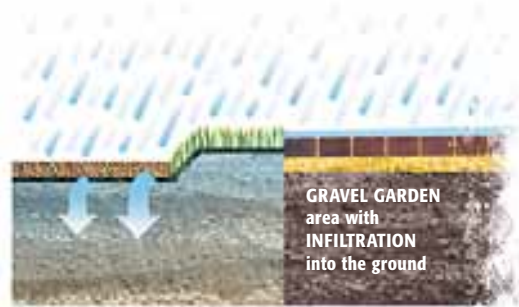
LOWER GEOTEXTILE

PERMEABLE SUB-GRADE



The open, graded sub-base materials and geotextile layers must still be compacted in the same way as an impermeable paving sub-base to provide a firm foundation for the paving system to be trafficked, but will have voids between the pieces of stone. This system allows all rainwater falling onto the paved area to infiltrate down through the joints or voids between the blocks, passing through the constructed layers

below and eventually into the sub-grade. The temporary reservoir created by the 33% void ratio of the sub-base may store some of the water before it eventually infiltrates the sub-grade. This 'Zero Drainage' system requires no discharge into traditional drainage systems, removing the need for pipes and gulleys resulting in cost savings.



Water from conventional driveways is directed onto rain gardens



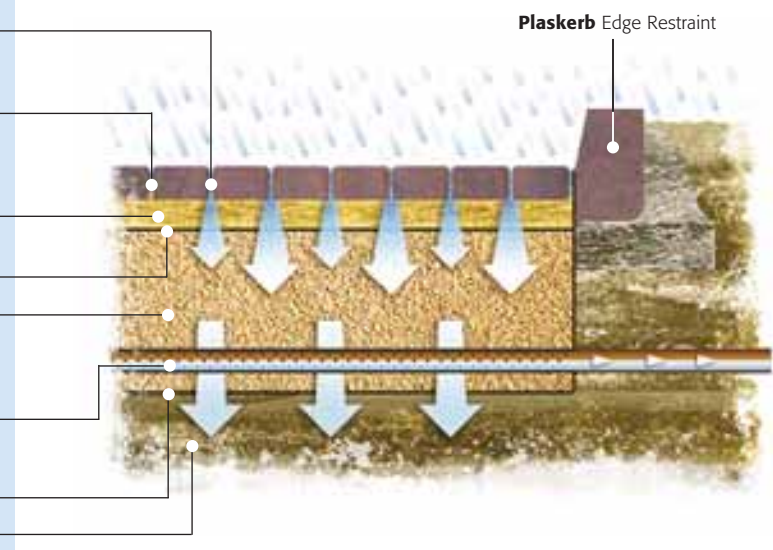
intelligent paving for Sustainable Driveways

Method 3

Similar to Method Two, **PARTIAL INFILTRATION SYSTEMS** may be used in situations where existing sub-grade may not be capable of absorbing all the water. This system can, therefore, prevent the sub-grade from becoming water logged and losing its stability.

Permeable Block Paving and **Partial Infiltration**

- JOINTING MATERIAL  
2mm-6mm crushed angular gravel/rock
- Plaspave Permi-8**  
60mm or 80mm Block Paving
- 50mm AGGREGATE BEDDING COURSE  
2mm-6mm crushed angular gravel/rock
- UPPER GEOTEXTILE
- PERMEABLE COURSE  
4mm-20mm crushed coarse graded aggregate depth determined by design
- PERFORATED PIPE wrapped in geotextile material
- LOWER GEOTEXTILE
- PARTIALLY PERMEABLE SUB-GRADE



In this system Permi.8 paving sits on top of a permeable sub-base which surrounds a perforated outlet pipe which allows the excess water to be drained to other drainage outlets such as sewers, swales or watercourses.

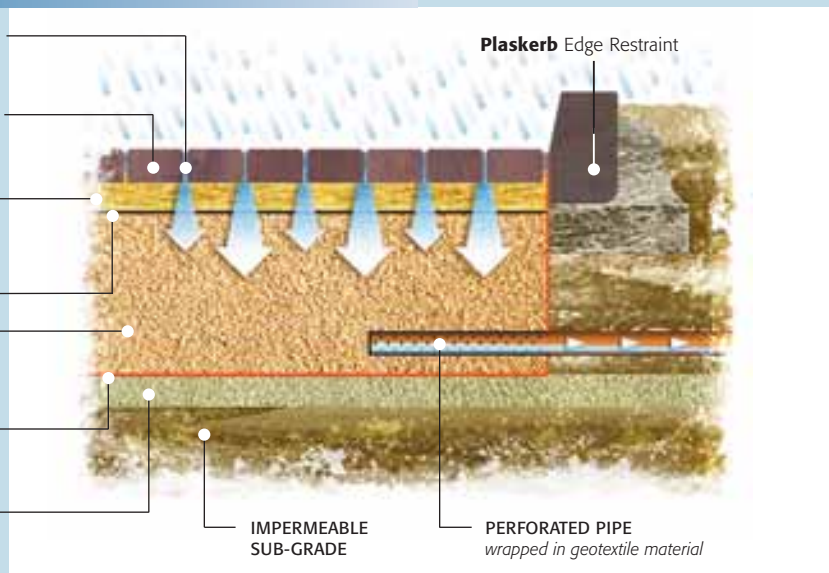
Whilst a high proportion of the rainfall is allowed to infiltrate through the system into the sub-grade, the excess is discharged with a peak discharge rate that is agreed with the Local Authority or Environmental Agency.

Method 4

The **NON INFILTRATION/TANKED PAVING SYSTEM** is employed in situations where the existing sub-grade has low permeability such as a heavy clay soil where there is little opportunity for infiltration. It is also used where the sub-grade is of low strength and liable to damage by the introduction of additional water.

## Permeable Block Paving and Non Infiltration or Tanked Systems

- JOINTING MATERIAL**  
2mm-6mm crushed angular gravel/rock
- Plaspave Permi-8**  
60mm or 80mm Block Paving
- 50mm AGGREGATE BEDDING COURSE**  
2mm-6mm crushed angular gravel/rock
- GEOTEXTILE**
- PERMEABLE COURSE**  
4mm-20mm crushed coarse graded aggregate depth determined by design
- IMPERMEABLE FLEXIBLE GEOMEMBRANE**
- SUB-GRADE CAPPING**  
to protect impermeable flexible geomembrane



### Pipe Outlets and Outflow

Pipe outlets from Non-Infiltration or Tanked paving systems penetrate the impermeable flexible membrane. To ensure watertight connection, proprietary 'top-hat' seal systems should be employed. Non-Infiltration/Tanked paving system design assumes that the system outflow rate is restricted to the accepted 'Greenfield' run off rate of 5 - 7 litres/sec/hectare. This minimises the impact on drainage networks and water courses during storm events. This discharge rate can be accommodated using a 100mm diameter pipe with the flow restricted by proprietary flow control systems. The spacing and location of outlet pipes will be dictated by site layout and available points of discharge.

*Outlets to the urban drainage system may need permission from the Local Authority/ Environment Agency.*

This system allows for the complete capture of all the water falling on the paved area. This is achieved by placing an impermeable flexible geomembrane on top of the sub-grade and up the sides of the permeable sub-base to effectively create an underground tanked reservoir. Non-Infiltration/Tanked paving systems are particularly suitable for contaminated sites as it prevents pollutants from infiltrating the sub-grade from where they are eventually washed into the groundwater. The stored water can also be re-used for not-potable purposes such as irrigation, car washing or toilet flushing. (See Method Six - Rainwater Harvesting).

### Capping Layer

For Non-Infiltration/Tanked paving systems, it is necessary to lay a layer of capping material below the impermeable flexible geomembrane to provide a firm working platform for the overlying construction layers. Two types of capping material are recommended for use in the Specification for Highway Works 2007), 6F1 (finer material) and 6F2 (courser material). If 6F2 material is used it will be necessary to blind the surface with fine material to prevent puncturing the impermeable geomembrane.



**GEOTEXTILE** is a permeable fabric which filters the water passing through and stops any migration of the bedding course into the sub-base. In the 'tanked' system

**GEOMEMBRANE** is used underground to minimise the loss of water.

Method 5

In situations where increased water storage capacity or shallower sub-bases are demanded, **PERMEABLE SUB-BASE REPLACEMENT SYSTEMS** can be incorporated into permeable paving systems. These proprietary sub-base systems consist of geocellular boxes made of lattice plastic crate-like structures which are connected together to form a rigid raft structure that replaces some or all of the permeable sub-base depending on traffic loading.

## Permeable Block Paving and Permeable Sub-base Replacement Systems

The water storage capacity is higher than with conventional granular aggregate sub-bases, with some void ratios of up to 90%. Consequently the overall depth of construction can be reduced resulting in shallower excavation and reduced material disposal to landfill. This type of system typically incorporates a Rainwater Harvesting facility.



Waterloc 250 Cellular Units supplied by Marley



Polystorm Cellular Units supplied by Polypipe



Specialist design advice is available from manufacturers of the cellular units

**RAINWATER HARVESTING** is the collecting of rainwater from roofs and the underground tanked systems of permeable paving to use in or around buildings for non potable purposes such as watering the garden, car washing or toilet flushing. The run off water used for harvesting needs to be of reasonable quality and should be free of debris and sediments. Permeable paving systems will provide the filtration to achieve this.

## Permeable Block Paving and Rainwater Harvesting



Distinctive Finishing Touches & Details

**COMO COBBLESTONES** are an ideal way of adding extra texture and detail to the edging on driveways and paths and mixing different colours can add extra interest and pattern. **PLASKERB** edge restraints help to support traffic loads, contain lateral movement and are available in large and small kerbs and as the popular Weathered Kerb.

See pages 62-63 for further information on the full range of Plaspave Kerbs and Accessories.



**The water can be stored in the permeable sub-base of a permeable paving system.**

It is however very important to note that the storage volume for re-use is normally separate to that for rainfall attenuation. This is because the two types of storage have different requirements.

**Rainwater re-use - must be full for as much of the time as possible so that water is available for use.**

**Stormwater attenuation - must be empty most of the time so that it can temporarily store water from rainfall events.**

Rainwater Harvesting systems will usually have an overflow or pipe outlet to a soak away or to the urban drainage system. The outlet principles for Non-Infiltration/Tanked systems shall apply. Rainwater Harvesting will not only reduce rainwater run off into the drainage system but will also reduce the amount of mains water used. This contributes to water efficiency and provides savings on water bills if using metered water.

Advice is available from the UK Rainwater Management Association - [www.ukrma.org](http://www.ukrma.org)

### Where can I find further information about Permeable Paving Systems?

For up to date information on the current regulations for hard landscaping in front gardens, visit:-

[www.planningportal.gov.uk/permission/house](http://www.planningportal.gov.uk/permission/house)  
[www.paving.org.uk](http://www.paving.org.uk)  
[www.environment-agency.gov.uk](http://www.environment-agency.gov.uk)  
[www.defra.gov.uk](http://www.defra.gov.uk)  
[www.sudssource.org](http://www.sudssource.org)

For information on block paving contractors, visit:-

[www.bali.org.uk](http://www.bali.org.uk)  
[www.interlay.org.uk](http://www.interlay.org.uk)



PLASPAVE PERMEABLE

# IMPORTANT READING FOR PAVING CONTRACTORS and DOMESTIC CUSTOMERS

## FITNESS FOR PURPOSE

All products featured in this brochure are intended for residential /domestic use either as footpaths, patios or driveway/parking areas for cars and light vans. The manufacturer cannot be responsible for the loss of driveway integrity or paver damage resulting from overrun by trade vehicles, large vans, trucks, skips and similar heavy traffic. All Plaspave Concrete Block Paving products are manufactured by companies in the Plasmor Group under Quality Assurance BS EN ISO 9001:2015 and BS EN 1338:2003, including Weathering Resistance Class 2. Plasmor expects the paving contractors and householder to inspect packs of product prior to laying and in the unlikely event that any pack of product reaches you in an unsatisfactory condition, the Merchant Retailer should be notified immediately. **It is important to identify any defect that is visually apparent prior to laying as the manufacturer cannot be responsible for costs of uplifting and relaying.** All products supplied by Plasmor Limited are subject to standard Plasmor Conditions of Sale which outline the extent of our Manufacturer's liability.

## CHOOSING A COLOUR

The colours in this brochure are as accurate as reprographic and four colour printing processes allow. **WHEN FINALLY DECIDING ON COLOURS, IT IS RECOMMENDED THAT CUSTOMERS SEE SAMPLES.** One of the positive benefits of Plaspave is that colours will appear to change very slightly in different levels of light. You will notice a difference between bright sunlight, summer and winter light, wet and dry. It should also be noted that while every effort is made to ensure the consistency of product colour and texture across batches and between factories some slight variation is possible. Please ensure you order all the packs you require so that they can be supplied from the same batch. Paving contractors should follow best laying practice - mixing product on the site from a minimum of three packs.

## LAYING ADVICE

Please ensure you order all the packs you require so that they can be supplied from the same batch. Paving contractors should follow best laying practice - mixing product on the site from a minimum of three packs. Products such as Sorrento, Amalfi and Ginestro are rumbled during manufacturing and this process may leave a dusty residue on the surface of some pavers. This will weather in and be removed over time by rainfall - alternatively it could be removed more quickly by the application of a patio cleaner. This unavoidable residue, although it may be considered unsightly, will in no way affect the performance of the paving. Despite being randomly packaged in the pack, it may not be immediately obvious that Sorrento, Amalfi and Ginestro have a top and bottom - it is important to lay all blocks top upwards! The top face has deeper colours and superior texture. The spacer nibs are designed to work correctly only when all product is laid "top upwards". Please take a moment to familiarise yourself with the product and observe the positioning of the vertical spacer nibs.

## EFFLORESCENCE and DIFFERENTIAL DRYING

Plaspave product ingredient mixes combined with modern, sophisticated curing technology contribute to reduce the incidence of EFFLORESCENCE. However, all concrete products have a tendency to be subject to efflorescence staining in their early life. This is a naturally occurring phenomenon which should not be regarded as cause for concern. Efflorescence is not detrimental to the performance of the pavers and is usually a temporary condition which tends to disappear with weathering over a period of time.

On occasions, darker patches may be visible on the surface of the paving blocks. This is due to DIFFERENTIAL DRYING and it will disappear over time as the blocks dry out. Differential drying occurs as a result of the paving blocks being cured at slightly different rates; they may subsequently dry out at different rates. This is no way detrimental to the strength, durability or performance of the product. Plasmor cannot be responsible for this temporary effect.



Plaspave's **10 YEAR PRODUCT GUARANTEE** is your **PEACE OF MIND** - full details available on request or visit [www.plaspave.co.uk](http://www.plaspave.co.uk) for further information

**For further information contact one of the Plasmor Limited regional telephone numbers:**

**EASTERN ENGLAND:**  
**01977 673221**

**WESTERN ENGLAND:**  
**0151 423 1161**

**or visit our website where you can view inspirational homes and gardens and contractor and stockist details:**

**TRADE VISITOR**  
**[www.plasmor.co.uk](http://www.plasmor.co.uk)**

**HOME OWNER:**  
**[www.plaspave.co.uk](http://www.plaspave.co.uk)**

**SORRENTO, AMALFI & GINESTRO TO IDENTIFY THE TOP**  
**With a right hand grip, the forward facing right hand side of the block should have the spacer-nib 25mm from the front edge. If the spacer nib is 50mm from the front edge then the block is upside down.** It will soon become obvious that the visual appeal of the project is improved when all blocks are correctly laid top upwards.



**ERRORS, OMISSIONS AND CHANGES**  
*Every effort has been made to ensure the accuracy of the information provided in this brochure but it is published errors and omissions excepted. No part of the brochure constitutes part of an actual or implied contract. Plasmor's Standard Terms and Conditions apply. Colours, textures, dimensions, weights are subject to manufacturing tolerances and the specification and availability of product ranges and colours may be subject to change without prior notice.*

© Plasmor Ltd. September 2022