Communities and Local Government

Environment Agency

Guidance on the permeable surfacing of front gardens



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September 2008
Department for Communities and Local Government

Communities and Local Government
Eland House
Bressenden Place
London
SW1E 5DU
Telephone: 020 7944 4400
Website: www.communities.gov.uk

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Guidance on the permeable surfacing of front gardens

Introduction to the leaflet

From 1 October 2008 the permitted development rights (see Glossary) that allow householders to pave their front garden with hardstanding without planning permission have changed in order to reduce the impact of this type of development on flooding and on pollution of watercourses.

You will not need planning permission if a new or replacement driveway of any size uses permeable (or porous) surfacing, such as gravel, permeable concrete block paving or porous asphalt, or if the rainwater is directed to a lawn or border to drain naturally.

If the surface to be covered is more than five square metres planning permission will be needed for laying traditional, impermeable driveways that do not provide for the water to run to a permeable area.

Applying for planning permission will require you to fill in an application form, draw plans (which have to be to scale) and pay a fee of £150. Planning applications for this type of householder development should normally be decided within 8 weeks after submission.

This leaflet explains the different approaches to constructing a driveway or other paved area that controls and reduces rainfall runoff into drains by using permeable surfaces or soakaways and rain gardens (a small planted depression designed to manage rainwater – see Glossary). The advice can also be applied to other paved areas around the house, such as patios.

The guidance has six main sections:

1. What is the problem with paving front gardens?
2. How can we prevent the problems?
3. Types of surfaces
4. How to design and construct permeable surfaces
5. Looking after a permeable driveway
6. Where can I find more information?
7. Glossary

Section 1

What is the problem with paving front gardens?

Serious flooding in 2007 affected the UK. This resulted in loss of life, disruption of peoples' lives and caused damage estimated at about £3bn. In many cases the flooding happened because drains could not cope with the amount of rain water flowing to them. The effects of climate change mean that this kind of heavy rainfall event (and subsequent flooding) may occur more often in the future.

The drains in most urban areas were built many years ago and were not designed to cope with increased rainfall. Paving front gardens further adds to the problem. Although paving over one or two gardens may not seem to make a difference, the combined effect of lots of people in a street or area doing this can increase the risk of flooding.

The harm caused by paving gardens is not limited to just flooding. Hard surfaces such as concrete and asphalt collect pollution (oil, petrol, brake dust etc) that is washed off into the drains. Many drains carry rainwater directly to streams or rivers where the pollution damages wildlife and the wider environment. In older areas the rainwater may go into the foul water sewer which normally takes household waste from bathrooms and kitchens to the sewage treatment works. These overflow into streams and rivers in heavy rainfall. As more water runs into foul sewers from paved areas there are more frequent overflows, passing untreated sewage into watercourses.

Replacing grass and plant beds with concrete and asphalt surfaces means that water does not soak into the ground. This reduces the amount that reaches our natural underground aquifers. Some water that soaks into the ground will evaporate back into the air, causing a cooling effect around the house. This is lost if the garden is covered with hard impermeable surfaces and can cause local temperatures to rise (often referred to as the urban heat island effect).

Section 2

How can we prevent the problem?

You can provide paved areas in front of your house without adding to flood risk and pollution. You can use permeable surfaces that allow water to drain into them or by other methods such as rain gardens (see below). Permeable driveways are often more attractive than an expanse of concrete, adding value to the property. These types of surfaces can also be better for the environment and do not necessarily cost more or require a lot of maintenance.

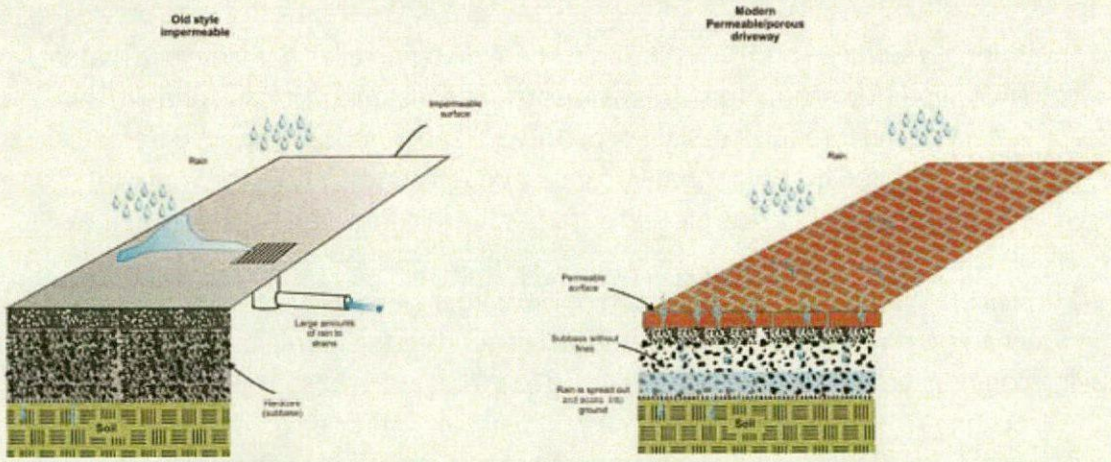
There are three main types of solution to creating a permeable driveway:

- Using gravel or a mainly green, vegetated area.
- Directing water from an impermeable surface to a border rain garden or soakaway.
- Using permeable block paving, porous asphalt or concrete.

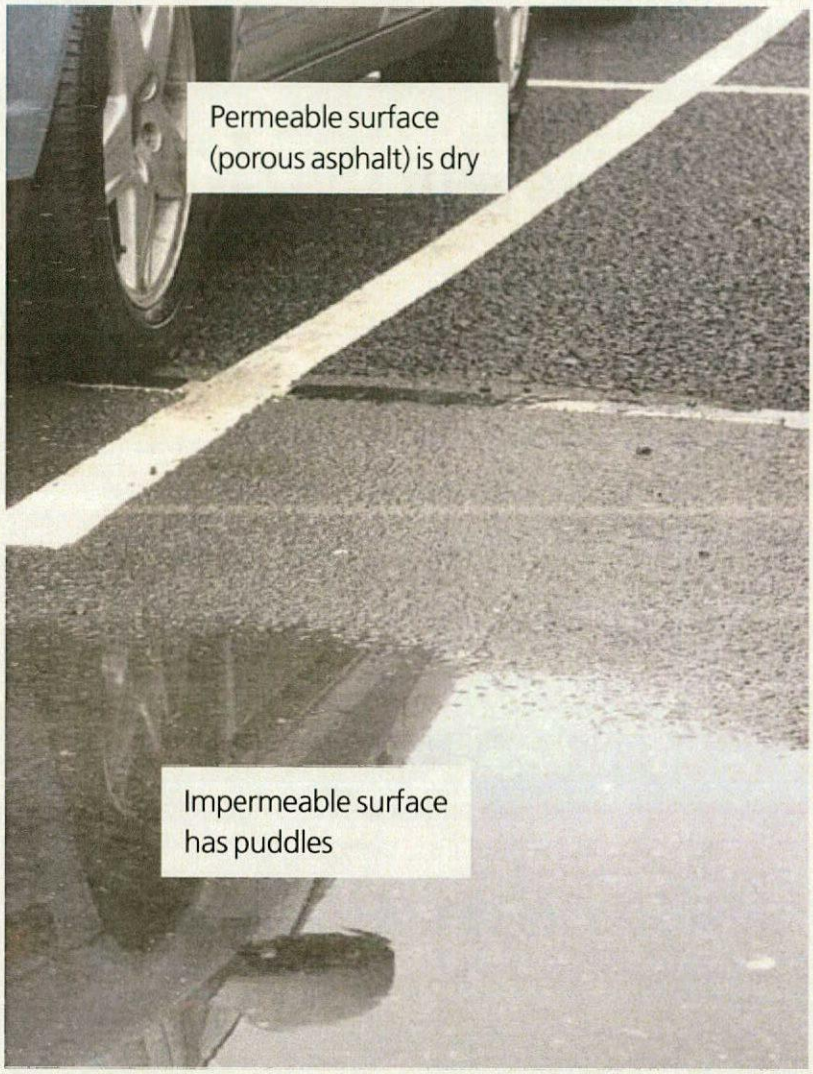
You can also combine the methods in a single garden to get an interesting appearance (A Royal Horticultural Society leaflet and their website give more information – See Section 6). The most appropriate construction will depend on factors such as the space available, slopes, the type of soil and whether the existing garden gets waterlogged.

How do they work?

Modern permeable surfaces work by allowing water to soak through the surface into the ground below. Soakaways can be located along the edges of impermeable driveways or in the garden area to collect water and allow it to soak into the ground. On clay soils it may be necessary to connect to the house roof water drain.



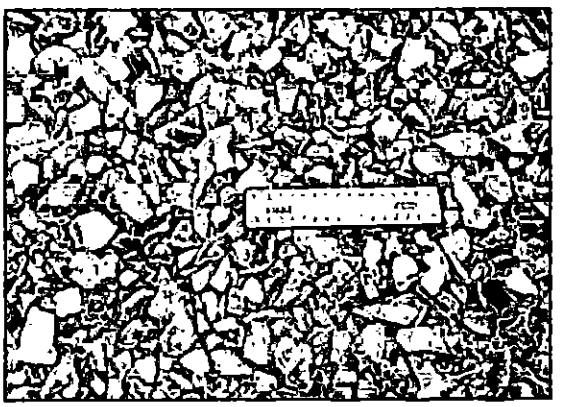
Permeable modern vs old style impermeable driveways



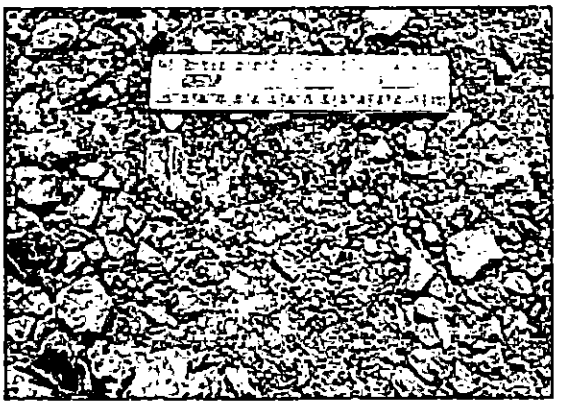
Permeable and impermeable surfaces after rainfall

The materials used in permeable construction are different to those used in impermeable driveway construction. Both types of surface have a sub-base layer used to make the ground strong enough to carry cars without rutting.

Conventionally surfaced driveways use a sub-base material called hardcore or a material called MOT Type 1 by contractors. This has a lot of fine material in it (sand and silt) that stops water passing through it easily. For permeable and porous driveways different materials are required that allow water to pass through and also store the water for a while if it cannot soak into the ground as fast as the rain falls. Various materials are available and two examples are known as 4/20 and Type 3 sub-base. These materials are described as open graded and consist only of larger pieces of stone that have space between to store water. The material used will depend on the permeable or porous system being constructed. If the rainwater is draining to a raingarden or soakaway the driveway construction can use traditional impermeable materials. The open graded materials must still be compacted in the same way as normal sub-base to provide a firm foundation for the driveway, but will have voids between the pieces of stone.



Permeable subbase (4/20 material)



Impermeable hardcore or Type 1

A bucket of water poured onto the permeable sub-base on the left will soak in straight away in a small area. It will take longer for water to soak into compacted impermeable hardcore or Type 1 and it will spread over a wider area.

What are the options?

Water from a paved surface can be dealt with using three main approaches:

- Soaking into ground (soakaway)
- Rainwater harvesting (see Glossary) or storage for later use
- Flowing to the drains, but this should be the last option considered and might not be permitted development

A combination of systems can also be used, where water soaks into the ground but there is also an overflow connection to the drains for periods of really heavy and extended rainfall. This is useful if the soils are clayey and do not drain very well. Rainwater harvesting systems will usually have an overflow to a soakaway or drain.

Where the new driveway is small, if the existing garden is not water logged it should be acceptable to allow the water to soak into the ground. If the garden is already waterlogged the sub-base below the driveway will need to be drained by connecting a pipe from within the sub-base to the drains.

Section 3

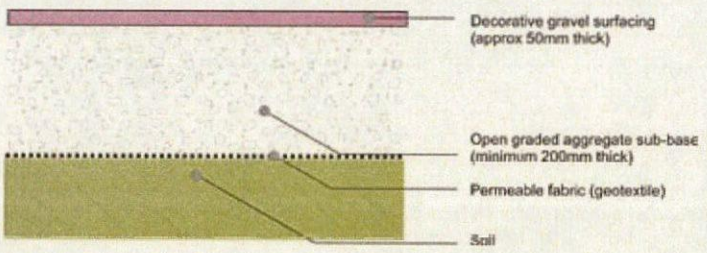
Types of surface

Planted and gravel driveways

The Royal Horticultural Society has identified many simple ways that a green or gravel driveway can be created. These green solutions provide an attractive space that can be used to park cars.

Loose gravel

This is the most simple type of construction. The driveway sub-base is covered by a surface layer of gravel or shingle. Gravel with different shapes and colours is available to make the surface more decorative. A strip of block paving or asphalt at the entrance can limit the loss and spread of gravel from the drive.



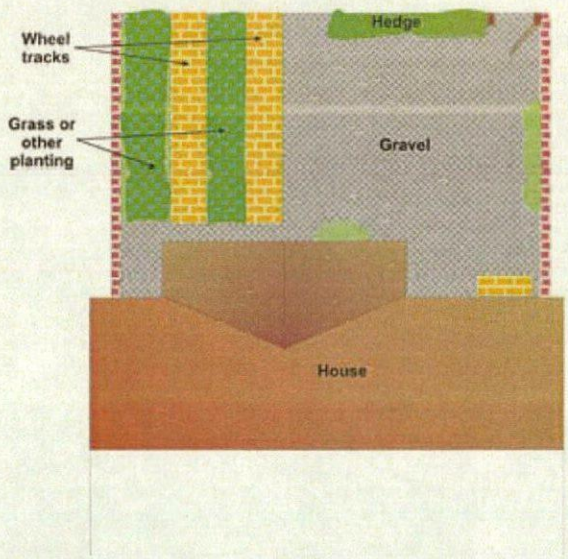




Pros	Cons
Simple to construct and maintain	Gravel will scatter or form waves
Cheap	Not suitable on steeply sloping drives
Materials readily available	Not suitable for wheel-chairs
Easily integrated with planting to provide visual enhancement to driveway layout	

Wheel tracks

To keep hard surfaces to a minimum a driveway can be created that has just two paved tracks where the wheels go. These can be surfaced with blocks, asphalt or concrete, but to provide a durable construction they should have sub-base below. The area between and around the tracks can be surfaced in gravel or planted with grass or suitable low growing plants. Water must drain from the tracks into the surrounding permeable area. Typical width is between 300mm and 600mm for each track.



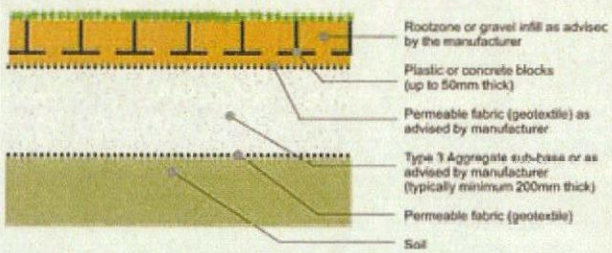


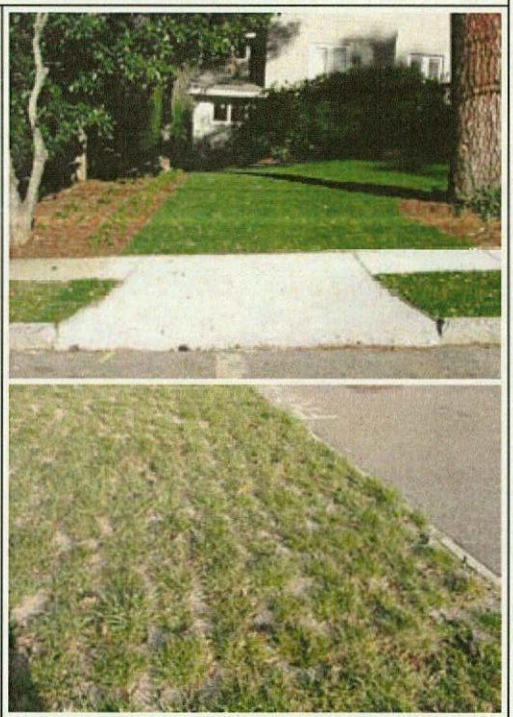


Pros	Cons
Simple to construct and maintain	Need regular maintenance to keep looking tidy
Cheap	
Easily combined with planting to provide visual enhancement to driveway layout	
Will not require planning permission if the area covered by the tracks is less than 5 sq m	

Reinforced grass and gravel

There are a number of systems available that increase the strength of a grass surface so that cars can drive over it without causing ruts. Both plastic and concrete reinforcement systems are available to strengthen the ground and reduce erosion. The plastic systems can also be used with gravel. The species of grass should be specified by the manufacturer of the system to ensure it is suitable for the intended location. Specific low growing grass that does not need a lot of mowing can be used.

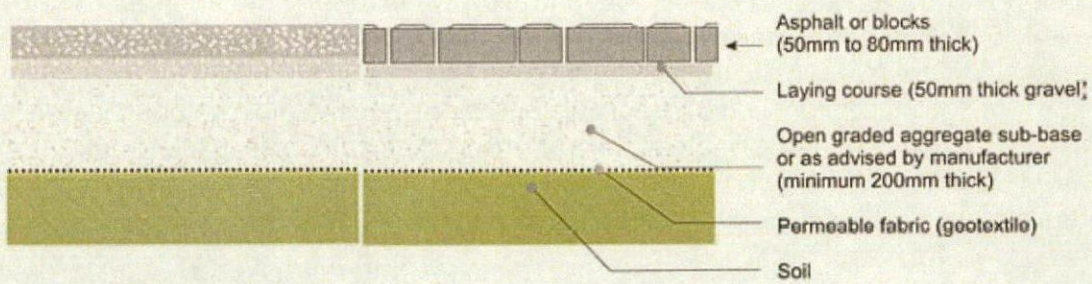




Pros	Cons
Simple to construct and maintain	May need mowing and maintenance to look tidy
Attractive	Not suitable where vehicles are parked continuously for a long period of time as the grass may die
Can help to reduce temperatures around the house, absorb pollution and dust and reduce noise	Gravel may require sweeping, particularly on a sloping driveway.

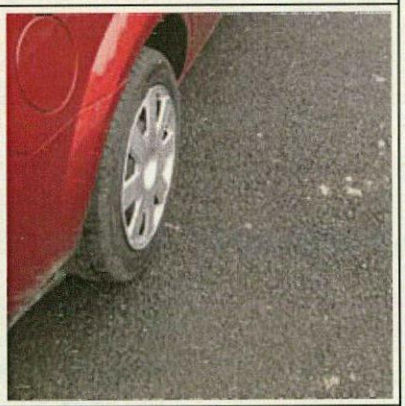
Hard permeable and porous surfaces

Hard surfacing which allows water to soak into it can be built with porous asphalt, porous concrete blocks, concrete or clay block permeable paving. The material has open voids across the surface of the material or around the edges of blocks that allow water to soak in. The surface is constructed over a permeable sub-base. Systems are available from a variety of manufacturers. Sources of further information are provided in Section 6.





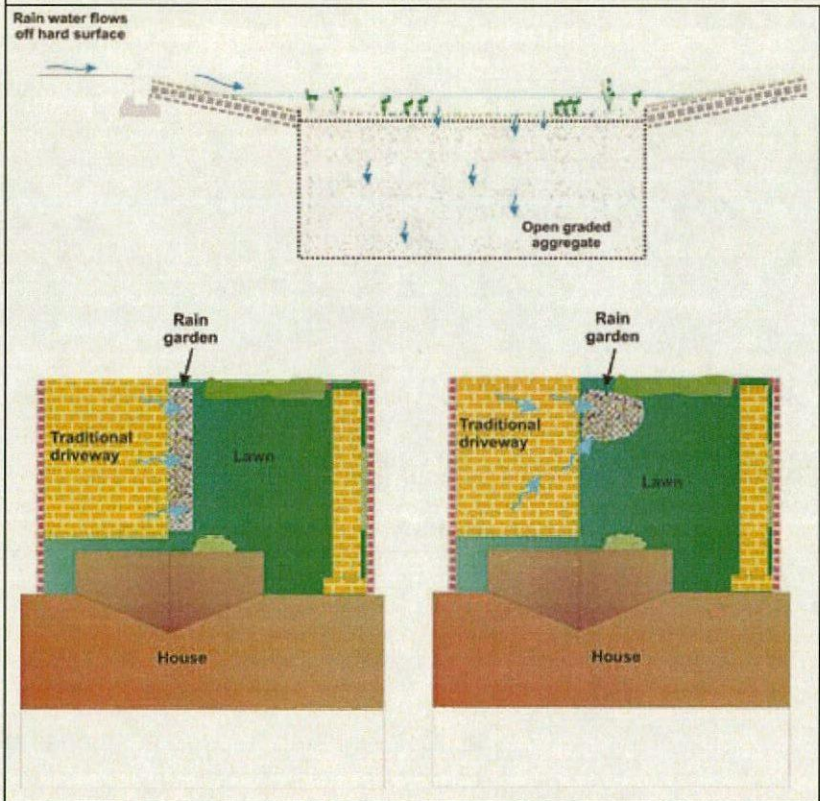




Pros	Cons
Hard and durable with a very long service life if correctly constructed	Can be more expensive than other options
Require the least amount of maintenance	Require knowledgeable contractor to construct correctly (especially porous asphalt which should be provided and laid by a specialist company)
Wide variety of shapes and colours available for concrete blocks	

Rain gardens and soakaways

Water from a conventional paved surface can be directed onto a border, rain garden or into a soakaway. An area of garden can be formed into a depression to collect and store rainwater from conventional impermeable surfaces (asphalt, concrete and block paving), before slowly allowing it to soak into the ground or to flow to the drains. The depressions can be located along the edge of the drive or as a larger area in the garden at a low point. The depression can be planted with suitable plants to help slow runoff or gravel or cobbles can be used as decorative features. There may be a gravel filled trench below it 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 a gravel filled trench or geocellular box (see Glossary) and allowed to soak into the ground. Many houses have the roof downpipes connected to soakaways. They are more suitable for houses with larger front gardens as they require space and need to be located a suitable distance from buildings. Further information on using gardens with block paving can be obtained from Interpave (see link below).





Pros	Cons
Can use conventional impermeable surfaces such as block paving, asphalt or concrete draining to the rain garden	Require deeper excavations
Attractive landscape feature	Require space to construct
	Require knowledgeable contractor to construct correctly
	Require suitable ground conditions (sand or gravel soils)

Rainwater harvesting

Water butts and underground rainwater tanks can be used to complement the drainage methods discussed above to reduce runoff from a property. The simplest systems are water butts where the water is used to water gardens or for washing cars. More complex systems use underground tanks and pumps to provide water to outside taps. The underground tanks can collect rainwater from roofs or from permeable driveways. The water can be used inside the house for toilet flushing, but this is more complex and it is best to consult a specialist rainwater harvesting company (see the UK Rainwater Harvesting Association website).

Rainwater harvesting will not only help reduce rainwater runoff into the drains but will also reduce the amount of mains water used. This can contribute to water efficiency and provide a saving on water bills if using metered water.



Installation of a rainwater harvester system below a permeable concrete block surface

Pros	Cons
Reduces demand for mains water	Installation requires specialist understanding
Water is naturally soft	Can be an expensive option
If water use is metered it can reduce bills	Difficult to retrofit
	Overflow required to drains or soakaway

Section 4

How to design and construct permeable surfaces

Depth of construction below permeable driveways

From the surface of proposed drive there will normally be approximately 200mm to 250mm of material forming the driveway construction. If it is hard to drive a 50mm square wooden peg more than 150mm into the ground then the soil is strong enough to support the drive. If it is easy to drive a peg beyond 150mm the ground may be too soft and you will need expert advice.

When digging out the drive, if there are any areas which seem softer than the rest, they will need to be dug out and refilled with sub-base. It is important to place a layer of permeable fabric material known as a geotextile at the base of the driveway construction, over the soil. This helps to stop the sub base sinking into the soil and also helps prevents weeds. About 150mm of sub-base is laid over the geotextile and compacted before the final surfacing is placed.

What to consider

Slopes – the driveway should be sloped away from the house wherever possible towards the road. Do not direct water into rain gardens or soakaways close to buildings. If the driveway slopes towards the house use a drainage channel to collect any excess water and connect it to the drains that take the roof water. If the drive is steeply sloping (greater than 1 in 20) it may not be suitable for permeable surfacing. In these cases an impermeable surface could be used and if possible the water directed to a soakaway, rain garden or as a last resort directly to the drains that take roof water. Don't direct water towards a neighbour's property.

Underground services – make sure there are no underground services close to the ground surface where you are paving (eg water pipes, cable TV, electricity cables, etc).

Contaminated sites – if you live on a site that was contaminated by previous uses the shallow soils may have been specifically designed to prevent water soaking into the ground. If this is the case you will have to connect the paved area to the drains. Permeable surfaces may still be used but a more specialist construction will be required that allows water from the sub-base to flow into the drains (See www.paving.org.uk for more details).

Who can construct permeable and porous driveways

It is best to use an experienced landscape or driveway contractor. Organisations like Interlay – The Association of Block Paving Contractors, the British Association of Landscape Industries (BALI) or the Quarry Products Association can provide details of suitable contractors (See Section 6). It is also useful to obtain references from previous clients.

Casual jobbing contractors who knock on your door and offer to lay a driveway should not be used to construct permeable driveways.

Other considerations

Changing existing driveways – Existing drives can also be converted to be permeable or drain to a rain garden. You should ask a builder for advice because the drive may also drain water from the roof.

Legal issues – If you are constructing a new access into the garden across the footpath (officially known as the footway) you will need to obtain permission from the local council to drop the kerbs and the public footpath may need strengthening. This is to protect any services buried in the ground such as water pipes.

What to look out for

- the soil below the driveway or rain garden must be sandy or gravely (not clay) otherwise a connection to the drains may be required. This can be checked by a simple test (See Interpave guide to responsible rainwater management around the home).
- on sites with very clayey soils that cannot soak up a lot of water, it is a wise precaution to include a pipe in the sub-base to drain water to the roof drains. This stops water sitting in the sub-base for a long time. The permeable pavement will still have the desired effect as the water has to soak into the surface, the underground structure will also provide some storage for the water which will slowly find its way to the pipe
- the aggregate used for the sub-base below permeable paving or to build a rain garden must have open voids in it and no fine material. Water should flow freely into it. The sub-base should be compacted as for conventional construction
- when the paving is completed water should soak easily into the surface of the driveway. If a hosepipe is turned onto the surface for 1 or 2 minutes there should be no puddles and the water should soak straight in without flowing over the surface more than 200 to 300mm

- rain gardens should not have mulch on the surface as this will float when water collects on it. The surface around the plants should be covered in a thin layer of gravel to reduce evaporation of water
- as a rule of thumb a pipe will be required if it takes a water filled 300mm by 300mm by 300mm pit more than 11 hours to empty (See Interpave guidance for more information)
- do not build rain gardens or soakaways close to building foundations. For small driveways a minimum distance of 3m should be suitable but it depends on the ground conditions and a greater distance may be required. Ask your local authority Building Control Department if you are unsure

Section 5

Looking after a permeable driveway

Permeable paving, soakaways and rain gardens can provide durable and long lasting drainage systems. They are different to normal driveways and observing a few do's and don'ts will get the best out of them.

Do	Don't
• clean up leaves, mud and litter before they have a chance to clog the surface • brush the surface if any dirt collects on it and this will reduce the risk of it blocking and help stop weeds growing • remove weeds by hand or with a weed burner	• put soil, sand or similar material on the driveway that will block the surface and stop water soaking in • mix concrete on the driveway • pour liquids such as oil on the surface • allow the garden areas to drain onto permeable surfaces as this can allow soil to wash into the surface and block it • use weed killer

If the surface of any of the systems blocks then it can be cleaned. For porous asphalt and porous/permeable concrete blocks the surface can be unclogged using a small vacuum road sweeper or a jet washer.

Section 6

Where can I find more information?

British Association of Landscape Industries	www.bali.co.uk	Provides a list of members that may be able to undertake work
CIRIA	www.ciria.org/suds	Independent research organisation providing detailed information on sustainable drainage and permeable surfaces
DCLG – Planning Portal	www.planningportal.gov.uk/house	Link to Planning Portal interactive house
Environment Agency	www.environment-agency.gov.uk/suds www.environment-agency.gov.uk/ppg	Guidance on the use of sustainable drainage systems. Guidance on pollution prevention measures
Interpave	www.paving.org.uk	Trade association for block paving manufacturers and provides guidance on permeable paving: • paving for rain • responsible rainwater management around the home
Interlay	www.interlay.org.uk	Independent association of block paving contractors provides a list of members.
UK Rainwater Harvesting Association	www.ukrha.org	Provides more information on rainwater harvesting and a list of members that can install rainwater harvesting systems.

Royal Horticultural Society	www.rhs.org.uk	A charity providing advice on gardening, and an on-line front gardens booklet: • *Gardening Matters, Front Gardens.*
Quarry Products Association	www.qpa.org	Provides a list of members that can supply the specialist subbase materials that are required and also asphalt laying contractors who may be able to lay porous asphalt
Nigel Dunnett and Andy Clayden (2007)	Rain gardens: managing water sustainably in the garden and designed landscape' Timber Press, 2007	More detailed information on the design of rain gardens and other methods of sustainable drainage

Section 7

Glossary

4/20 aggregate	See Open graded aggregate or sub-base.
Contaminated site	A site that was used in the past for industrial or other purposes that could have resulted in chemicals being spilt into the ground, eg gasworks, landfill sites, etc. These sites will have been cleaned up when housing was built but there may be chemicals still in the ground in small quantities which, whilst not a risk to health, may cause pollution if it is washed out of the soil by rainwater.
Geocellular box	Plastic crates that are used to make a void in the ground to store rainwater temporarily.
Geotextile	A plastic fabric that is permeable so that water can flow through it but it will hold soil in place.
Groundwater	Water contained in the soil or rock beneath the ground.
Hardcore	A gravel that is made up of a range of stone sizes including fine material that fills the voids between the larger stones. This makes it hard for water to pass through it quickly.
Impermeable	Surface that will not allow water to pass through it.
Open graded aggregate or sub-base	A gravel that is made up of a limited range of stone sizes so that there are open voids between the individual stones. This allows water to flow freely through it. Typical materials are known as 4/20 and Type 3 sub-base. You may need to contact one of the companies that supply the permeable surfacing in order to find a supplier of these materials.
Permeable surface	Any surface that allows water to soak through it. The surface can be **permeable** or **porous**. The surface made of materials that that allow water to soak through eg porous concrete and asphalt, gravel or from impermeable materials laid with gaps between blocks.

Permitted development rights	Alterations or additions that are allowed to houses and the surrounding gardens and yards that do not require an application for planning permission. Permitted Development rights for householders are set out in the Town and Country Planning (General Permitted Development) Order 1995. A restriction on the paving of front gardens was introduced in an amendment to the order coming into force on 1 October 2008. In some areas of the country, known generally as 'designated areas', permitted development rights are more restricted. If you live in a Conservation Area, a World Heritage Site, a National Park, an Area of Outstanding Natural Beauty or the Norfolk or Suffolk Broads, you will need to apply for planning permission for certain types of work which do not need an application in other areas. There are also different requirements if the property is a listed building. *The general advice is that you should contact your local planning authority and discuss your proposal before any work begins. They will be able to inform you of any reason why the development may not be permitted and if you need to apply for planning permission for all or part of the work.*
Porous surface	A material that has a lot of fine holes throughout that allows water to pass through it eg gravel, asphalt and grassed surfaces.
Rain garden	A landscaped depression in the garden that collects rainwater from a driveway and allows it to soak slowly into the ground or to the drains
Rainwater harvesting	Collection of rainwater from roofs and paved areas to use for non drinking purposes (eg watering the garden and washing cars).
Sub-base	A layer of compacted gravel that spreads the load from wheels so that the soil below is not overstressed.
Soakaway	An underground chamber or gravel filled trench that collects water from the driveway and allows it to soak into the ground.
Type 1 sub-base	A gravel that is made up of a range of stone sizes including fine material that fills the voids between the larger stones. This makes it hard for water to pass through it quickly. It is similar to hard core but of better quality.
Type 3 sub-base	See Open graded aggregate or sub-base.
Water butt	A small scale garden water storage device which collects rainwater from the roof.

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