

How You Can Help With Flood Management



Sussex
Wildlife Trust

Why do we need Flood management?

Increasing numbers of flood events cause catastrophic damage to life and property. Many people think that all flooding comes from rivers. However a study in 2013 showed up to 80 % of the properties at risk from flooding in West Sussex are at risk from Surface Water Flooding, (water running off hard, man-made surfaces) rather than river and sea flooding.

There are a range of reasons why there is more Surface Water Flooding, including more intense rainfall events, the increasing urbanisation of river catchments, and the over drainage of land. The fact remains that many people are now being affected by Urban flood risk as well as river, coastal and groundwater floods. We need to find practical ways to help reduce flood risks.

The climate is changing and intense rainfall events are becoming more frequent. Now is a good time to help reduce surface water run-off and to start using Natural Flood Management before weather conditions become really severe.



Flooding isn't my responsibility is it?

For most people, flooding is something which happens to them, and over which they have no control. In the case of river, groundwater and sea flooding this is often true, as natural forces are often too much for us individually to overcome. However in the case of urban surface water flooding, there is lots we can do to reduce its impact on our lives.

Once it has fallen from the clouds onto the land, all rain water has to go somewhere. In urban areas it can't filter into soils or be intercepted by trees and vegetation, so it runs quickly off to the nearest low point where it causes localised urban flooding.

The weight of water is greater than you think, One small (10 x 4 m) roof can generate around a tonne of water run off for every inch of rain. If you add on the run off from the other hard surfaces around your house such as driveways, then already each house can be contributing significant amounts of water to a surface water flood. Once you factor in roughly 160 litres of water per person per day which we send into the sewers (around 1 tonne per person per week), then each household contributes significantly to both urban and river floods (where the water eventually ends up). Larger developments such as roads, car parks and supermarkets can contribute huge amounts of run off to a local flood. There is no 'fix all' solution for flooding, and some floods are just unstoppable, but by using a range of techniques we can help to reduce their impact on people.

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I can't stop the rain falling, so surely I can't stop an urban flood?

There are some really easy ways that we can reduce the amount and speed of flood water running off our towns and cities. If every household in Sussex did one of the following, we could significantly reduce the amounts of water flowing off urban areas and creating floods. This includes things like :-

- Installing a water butt (or 4!) to harvest water from your guttering before it reaches land drains
- Creating a garden pond which takes the run off from your roof or hard surfaces
- Putting a green roof on your shed or garage
- Reducing the amount of water you put down the drain during high tides and rain storm events
- Plant local trees, bushes and other vegetation in your garden, or have patches of long grass instead of a very short lawn

Most of these measures have the additional benefit of being good for wildlife and the environment.

What can I do if I want to seriously reduce the flood run off coming off my house / land ?

A new way of managing urban floodwater has been developed called 'Sustainable (Urban) Drainage Systems' or SUDS. SUDS come in all shapes and sizes, but they give you a 'toolkit' of options of what you can do to help reduce urban flooding. If you or your neighbours are suffering from urban flooding, the following information may help you.

What are Sustainable Drainage Systems (SuDS)?

SUDS combine natural principles such as trapping and slowing down of rainwater by vegetation with engineering and drainage principles which capture and remove floodwater before it becomes a problem.

SUDS use these principles to help reduce 'flash' flooding in urban areas whilst also creating areas of habitat for wildlife, removing pollution and silt from run off, and helping to replenish underground drinking water supplies.

With SUDS, rain water is captured as soon as it falls, and is managed above ground rather than being drained into sewage and underground foul water systems. By managing the water where it falls it also reduces the impact of flood water on people downstream of the urban area.



Manor Park, Sheffield – the second wetland basin in this housing retrofit scheme improves water quality sufficiently to provide valuable habitat and a safe and visually-pleasing public open space.
Photo: Bob Bray

Visit www.engineeringnaturesway.co.uk and other contacts on the back page for more guidance on SUDS and flood risk management in the UK.

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General Principles of SUDS

If you follow these general principles when managing your urban run off :-

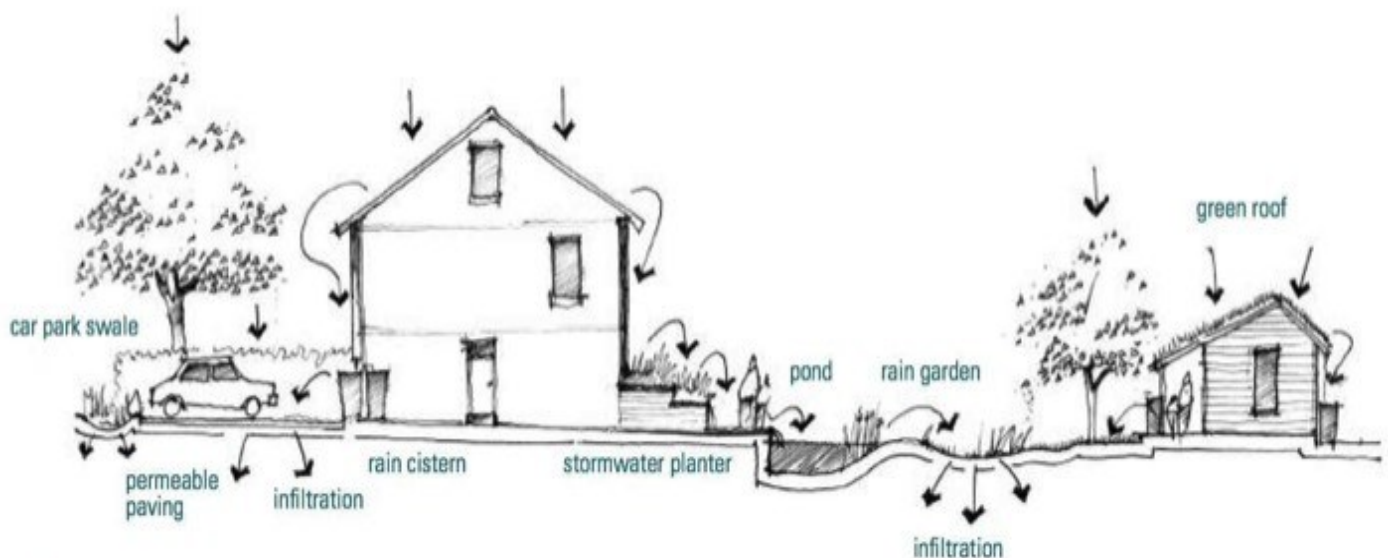
- **Capture and store as much rain water as possible**
Capture water before it drains off your house and concrete areas i.e. in a pond or a swale
- **Create natural surfaces**
These help to absorb the impact of heavy rain. Grass and trees, soil and gravel are better. They help 'filter' water into the ground instead of it running off man-made surfaces.
- **Recycle used (or grey) water**
Rather than pouring it down the drain, use grey water to water your garden. This will also help to reduce the flooding of sewage treatment works.
- * **Slow water down.**
When water is flowing fast, it can erode things and carry debris, silt and pollution. Water flowing through long grass, gravel or wetland slows down much more than water flowing across tarmac.

How do I create SUDS?

Installing SUDS during building is most efficient. However, for most people their house is already built, so they need to 'retrofit' their SUDS. Relatively low-cost techniques can be used to slow down runoff from concrete and other built surfaces including:

- Increased coverage of permeable surfaces, including permeable paving blocks
- Increased numbers of ponds and wetlands
- Green roofs and stormwater planters
- Greater recycling of roof runoff and grey water
- Using swales and infiltration trenches in low-lying bits of land next to impermeable surfaces

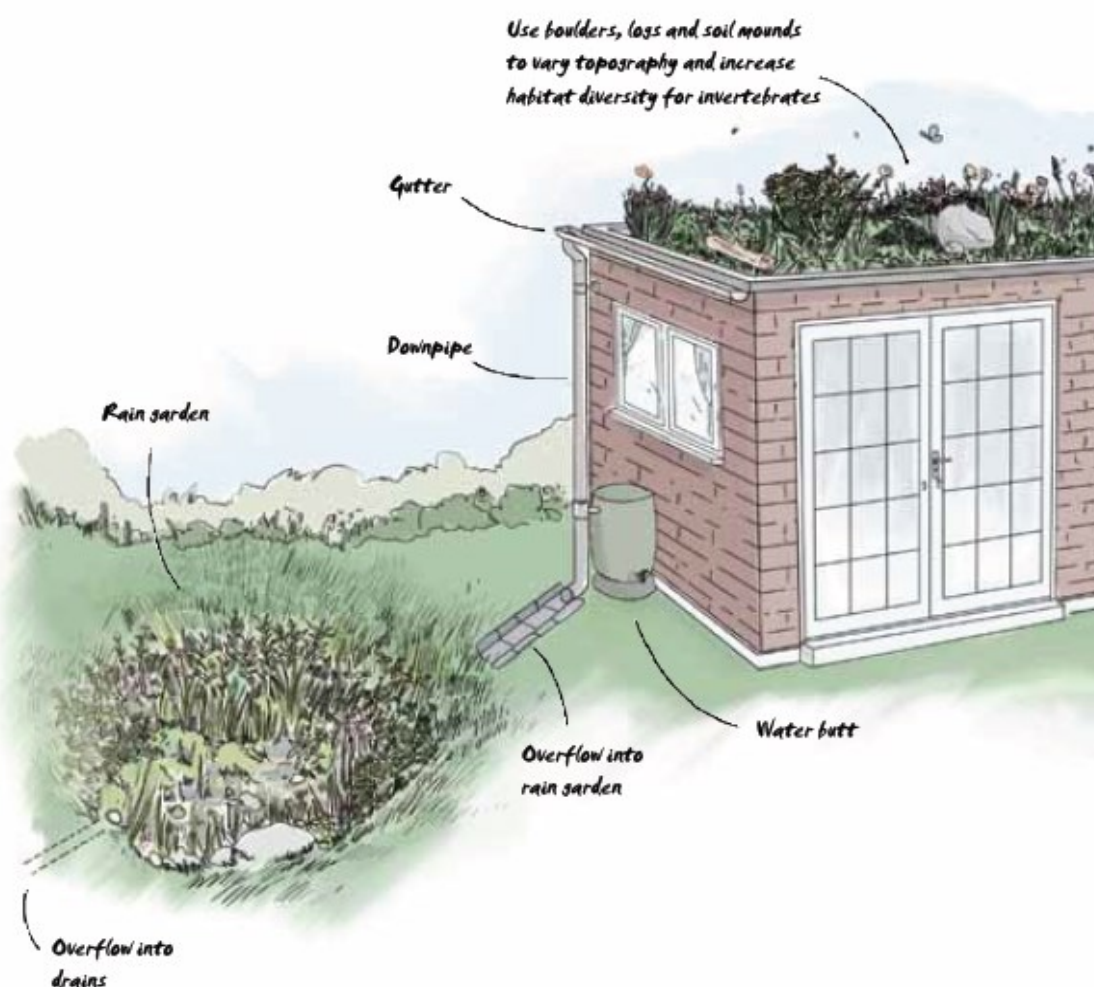
Something as simple as putting a gravel soakway in your garden so that water from your roof flows through guttering downpipes and across the lawn into a pond can greatly reduce surface water flooding.



Drawing by Andy Clayden, from 'Rain Gardens' (2007), by Nigel Dunnett and Andy Clayden.

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Figure 5 Extensive green roof linked to a rain garden via a water butt.

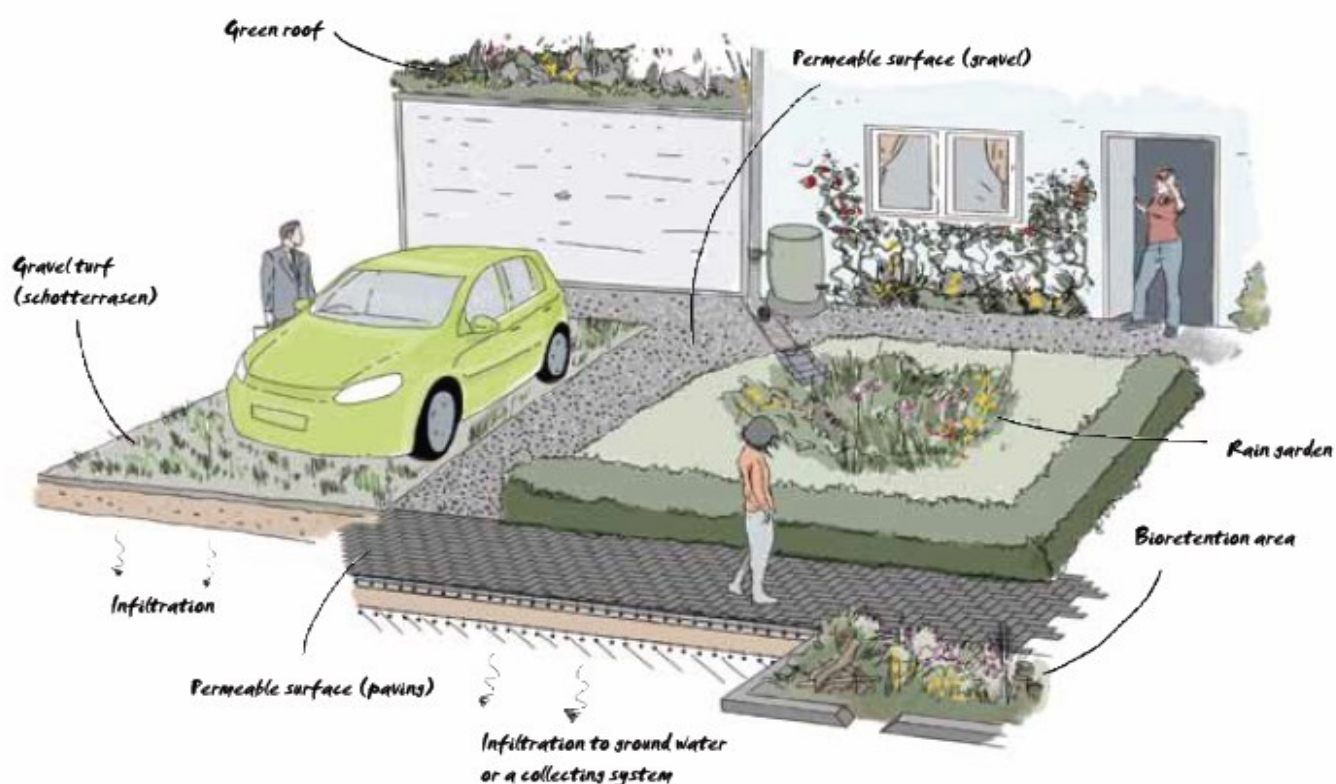


SUDS in and around the home

These pictures illustrate simple ways to include SUDS in and around the home.

Images are taken from **Sustainable Drainage Systems: Maximising the potential for people and wildlife**. A guide for local authorities and developers. 2012

Figure 8 A variety of permeable surfaces in a residential setting together with other source control features.



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Examples of Simple and Easy SUDS

There are 3 main types of SUDS - Retention SUDS, Conveyance SUDS and Detention SUDS. Here are some examples of each.

Retention features

(SUDS which take storm water run-off but which may also permanently hold water)

This storm water planter filters and dissipates rainfall run off from the road, whilst also providing green urban corridors and urban wildlife features which are 'self watering'.



Conveyance features

(These allow water to flow slowly along a wetland feature which directs the water the way you want it to flow)

This gravel swale is a good example. It captures rain and flood water and 'conveys' it along the gravel swale to a drain. The gravel also filters out pollution and silt. A good SUDS system will then convey the water from the drain into another SUDS feature such as a detention basin.

Detention basins

(Vegetated depressions which temporarily hold water)

Rooftop wetlands are an innovative way of capturing rainwater as it falls on your roof, creating habitat for wildlife such as dragonflies and birds, whilst helping reduce flood run off.

You can also use things like vegetated swales, or temporary ponds. Even a puddle is a detention basin!



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Community SUDS – Can we stop Urban surface water flooding ourselves?

Imagine how much surface flood water a town of 10,000 people can generate when it rains? Add in all the water being flushed down the toilet and poured down the sink and suddenly it is easy to see why our urban areas and rivers flood so quickly.

A big housing estate on a hill will generate lots of surface water run-off when it rains. This water flows downhill to housing on lower land which then floods. Historic planning mistakes mean that this is often no one's 'fault', but a concerted community effort can help to reduce both the impact of the surface water run off, and of the floodwater hitting low lying areas.

The key objective for any community SUDS should be to improve the quality of life for local people by enhancing public spaces and encouraging better wildlife and physical and mental health. At the same time these SuDS can provide flood protection, improve water quality and contribute to drought management. Contact your Local Authority and ask for their Flood Risk Management Strategy, and get involved in your Local Flood Group to have your say in how you can manage floods as a community.



Image © The Argus

Rain Gardens

Urban 'rain gardens' can be created in public spaces, which capture and store seasonal flood water whilst also creating urban green space and wildlife habitat. Carefully designed soakaways, planted with water loving vegetation, can provide an attractive and practical solution to encourage water passage and storage. Local grants are sometimes available to create rain gardens and SUDS.

The Oregon Example

Portland in Oregon in the USA is one of the best examples of how a whole city can be designed to prevent and store flooding, whilst making the city a much cleaner and greener space to live in.



Portland, Oregon, USA – SuDS can be incorporated into street landscaping to filter oils and pollutants as well as to attenuate rainfall. Photo: Dusty Gedge

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School SUDS

Some of the best and most creative SUDS are being created in schools. These can provide fantastic learning features for children, as well as providing more enjoyable recreational spaces, new wildlife habitat, and reduced flooding of school grounds.



Exwick School, Exeter – a path winding through filter strips, swales, grass channels and wetlands to a pond demonstrating the wildlife and people benefits of SuDS to teachers, students and visitors.

Photo: Bob Bray



Fort Royal Primary School, Worcester – three rain slides deliver roof water into a raised pool which overflows into a set channel and rill before flowing to a wildlife pond in green space, all accessible by children. Photo: Bob Bray

SUDS Maintenance

To create a sustainable SUDS system, consider and cost in future SUDS maintenance. Some SUDS stop working effectively if they become silted, polluted, dry etc.

Impacts of Traditional Drainage

Flooding – Traditional piped drainage networks convey water far more quickly than natural processes. Rivers respond quickly and violently to rainfall, exacerbating downstream flooding. Flooding also occurs where housing and other urban development such as the paving of gardens and the building of extensions (often referred to as 'urban creep') increases the volume and speed of run-off.

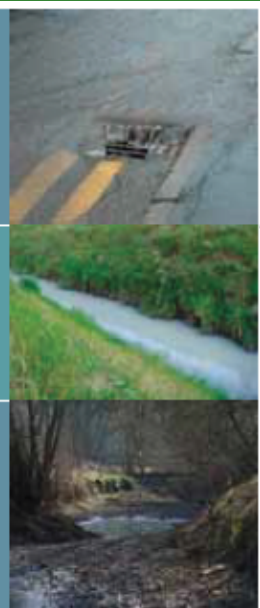
Surface water on road flowing into a drain on the side of Burnley Road, Crawshawbooth, Lancashire.

Pollution – Surface water run-off is often polluted with silt, oil and other contaminants which, when discharged to rivers, can harm wildlife and contaminate drinking water sources. Combined sewer overflows also discharge during periods of heavy rainfall where sewers are surcharged.

Pollution in Anglian region.

Low flows in streams and rivers – Piped drainage prevents natural percolation of rainfall into groundwater resources that support summer river flows. It can lead to the concentration of nitrates and phosphates in rivers and wetlands, causing an increase in algal blooms, harming wildlife and reducing amenity value.

Partially dried up bed of the River Ash as it flows through woodland riverbank near Much Hadham, Herts.



Photos: Environment Agency

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River and Sea Flooding

It is a lot harder to control large scale river and sea floods. We can protect ourselves through engineering techniques such as embankment building to some extent, but these measures cannot always protect us from some of the biggest floods. There are nonetheless a few ways that people who experience river and sea flooding can limit the damage caused by it. Golden rules include :-

- Try not to build or buy a house in a floodplain – see Environment Agency website for details
- If you live in a floodplain and it rains hard, check the Environment Agency website regularly for flood warnings
- If your house floods regularly, move electric points higher up the wall, and have floor surfaces which are easily clean/dryable. Keep valuable furniture and possessions upstairs
- Have sand bags and other flood proofing measures close at hand to limit the amount of water which flows in through doors and other gaps.

Other Natural Flood Management Measures

There are projects in Sussex which are helping people to create natural flood management measures. These include things like hedgerows, ponds, Large Woody Debris dams, SUDS etc. See www.sussexflowinitiative.org for more details.

Washland creation

Creating areas of floodplain where floodwater can temporarily flow out of river banks and across the floodplain can help to significantly reduce the flood peak, slow down flood flows and remove much of the damaging silt and debris that the flood carries. Traditional 'slubbings' from ditch and river clearance, along with man-made embankments often impede water from accessing washlands. It can be relatively simple to remove these small earth bunds and to enable washlands to function again.



Floodplain woodland planting

Tree planting on floodplains increases the 'roughness' of the floodplain and creates a natural barrier which slows down floodwater. Strategically placed floodplain woodlands can help to delay the synchronisation of flood peaks from different tributaries. Tree foliage helps to reduce the impact of heavy rain deluges, and trees also absorb and transpire water. Woodlands also store a great deal of water, and can withstand extended periods of flooding. They offer a range of other benefits to people and wildlife.



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Rural Sustainable Drainage Systems

Rural Sustainable Drainage Systems (RSuDS) is the rural equivalent of Urban SuDS for land use such as farming and forestry where run-off contributes to flooding, erosion and pollution.

Individual or multiple RSuDS can be used to mimic natural processes, and to collect, store and improve the quality of run-off in rural areas. The techniques are similar to SuDS, but adapted for a rural setting and for agricultural best practice. They include :-

- * **Detention basins & ponds**, including infiltration basins & retention ponds
- * **Woodland, Hedgerows and Shelter belts**
- * **Buffer strips**, such as dry grass buffer & filter strips & riparian buffer strips (wet or dry)
- * **Planting headlands**
- * **Wetlands** — Constructed wetlands such as reedbed, washland and wetland restoration,
- * **Farm building SuDS including** rainwater diversion and harvesting, green roofs, pervious surfaces, cross drains etc.
- * **In channel** SuDS including grassed waterways and swales, infiltration trenches, filter / French drains, online scrapes and wetlands within ditches
- * **Barriers and silt traps**
- * **Berms and water diversions**

Landowners wishing to create more RSuDS could consider the following changes in land management:-

1. Diversifying intensive grasslands with more plant species, including robust native wild flowers that have deep roots, which will fix nitrogen, and which promote healthier animals. Diversifying grassland can help to make land less liable to waterlogging and damage.
2. Maintaining, restoring and extending diverse pastures and wetland areas
3. Using more robust livestock breeds that do not depend on high-chemical input grasslands. Evidence is building that extensively reared cattle breeds are showing better profitability.
4. Significantly reduce maize-growing and intensive arable cultivation of land which floods frequently, replacing it with sustainably farmed grassland.
5. Strategic siting of gateways/hedges to create barriers to run off at the base of field slopes
6. Planting more hedgerows and managing hedgerows less frequently, allowing them to grow to 2m in height and to a greater width. Good hedgerows need less frequent cutting, will save costs and help farmland wildlife. Bigger hedges and more hedgerows tree help to keep more water in the landscape, for longer.
7. Design and install small-scale wetlands to intercept waste from yards and reduce runoff into ditches. These wetlands can provide additional benefits, e.g. fish, shooting, craft products (e.g. see www.biologicdesign.co.uk/page.php?pageid=wetoverview) and help to diversify farm income. There are increasing case studies demonstrating that wastewater can be an asset, not a problem.
8. Consider how to reduce damage to roads and verges from farm machinery and road transport. This is now a significant source of silt pollution in watercourses.

The Pont Bren Farmers — Reducing Flooding Their Way

An outstanding example of how farmers and landowners took flood and landscape management into their own hands can be found at www.pontbrenfarmers.co.uk.

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Legal requirements

The Flood and Water Management Act (2010) is the key legislation relating to SUDS. The Act will make it compulsory for all new developments to install SUDS, and will remove the automatic right of connection to sewers unless a drainage scheme is approved by a SUDS Approving Body (SAB). Local Authorities have a duty to ensure that SUDS are installed appropriately.

If you are installing SUDS ponds, or SUDS on buildings, you may need to check with your local council planning department to see if you need planning permission. If you are making changes to an existing stream or watercourse, check with your local Environment Agency team first. Consider who and how you will manage your SUDS in the long term.



Ponds can provide temporary storage for floodwater as well as habitat for wildlife.

Contacts

Sussex Wildlife Trust
(Wetlands Project)

www.sussexwildlifetrust.org.uk

01273 497555

Environment Agency

Ask for local Fisheries & Biodiversity or
Land Drainage consent teams

03708 506506

www.environment-agency.gov.uk

Wildcall

01273 494777

Wildcall@sussexwt.org.uk

Sussex Flow Initiative — River Ouse

www.sussexflowinitiative.org

UK Rainwater Harvesting Association

www.ukrha.org/about-us/

References & Further reading

Sustainable Drainage Systems: Maximising the potential for people and wildlife. A guide for local authorities and developers. 2012. www.rspb.org.uk/Images/SuDS_report_final_tcm9-338064.pdf

The Ecological Issues 2013: The Impact of Extreme Events on Freshwater Ecosystems

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Engineering Natures Way. www.hydro-int.com/UserFiles/Hydro_e-guide.pdf

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Sustainable Urban Drainage Systems Network. <http://sudsnet.abertay.ac.uk/>

Sussex wetlands project promotes the sustainable management of rivers and the restoration of wetland habitats for people and wildlife

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