Resources guide for SuDS Design

A practical guide to using free available resources to support effective Sustainable Drainage Design in the UK

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A civil engineering guide for architects, developers and design & build contractors (UK) by dbstructural.

Summary

Sustainable Drainage Systems (SuDS) are a fundamental requirement of modern development in the UK. When designed well, they manage flood risk, improve water quality, enhance biodiversity and support climate resilience while also satisfying planning policy and regulatory requirements.

Many SuDS strategies fail or are delayed at planning stage because available information has not been used effectively early on. As a result, drainage proposals can lack technical justification, conflict with site constraints, or fall short of Local Planning Authority (LPA) and Lead Local Flood Authority (LLFA) expectations.

The purpose of this guide is to educate project teams on the key publicly available resources that can be used to inform SuDS design decisions.

By understanding what information is available, and how it should be interpreted, architects, developers and design & build contractors can engage more confidently with drainage strategy at an early stage and improve the overall quality and resilience of their proposals.

The importance of evidence

Planning authorities increasingly expect SuDS strategies to be:

- Site-specific
- Policy-compliant
- Evidence-led

A generic or overly optimistic drainage approach is unlikely to be accepted, particularly where flood risk, surface water or climate change impacts are a concern.

Much of the evidence required to build a SuDS strategy begins with data that establishes:

- Ground conditions
- Flood risk context
- Existing infrastructure constraints
- Feasible drainage hierarchy options

Understanding and using this information correctly allows teams to:

- Work efficiently with planning guidance
- Demonstrate due diligence
- Avoid reliance on assumptions that cannot be justified later

1 Understanding ground conditions

BGS (British Geological Survey) Geology Viewer

The BGS Geology Viewer is a free, interactive web application provided by the British Geological Survey (BGS) that provides an overview of geological conditions across Great Britain.

The viewer's following key features help identify ground requirements:

Bedrock geology
Shows the solid rock layers (e.g. chalk, sandstone, or clay) that lie deep underground.

Superficial deposits
Shows the younger, looser layers on top of the bedrock, such as river sands, gravels or glacial 'till'.

3D terrain visualisation
You can drape the geological maps over a 3D terrain model to see how the rock layers follow the landscape.

BGS Lexicon links
Tapping any area on the map provides a description of the rock type and links to the official BGS Lexicon for detailed technical data.

Relevance to SuDS design

Ground conditions are one of the primary factors influencing whether infiltration-based SuDS are viable.

1. High Permeability

If the geology viewer shows Sand or Gravel, the ground is likely good for soakaways.

2. Low Permeability

If the viewer shows London Clay or mudstone, the ground may be ‘impermeable’, meaning you likely cannot use infiltration and must move down the hierarchy to a watercourse or sewer.

3. Hazard Identification

It helps identify risks like ‘running sands’ or ‘soluble rocks’ (like limestone) that could cause sinkholes if you pump too much water into them.

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BGS (British Geological Survey) GeoIndex

While the Geology Viewer summarised above is a lightweight tool for the general public and early-stage planning, engineers often use its older sibling, the BGS GeoIndex.

The GeoIndex contains more advanced data, including borehole records. These logs record any findings from other parties who have drilled into the ground nearby.

Borehole logs capture soil and rock descriptions, sample depths, groundwater observations and in-situ test results that directly inform foundation design, earthwork planning and construction risk management.

While not a substitute for site investigation, this data can significantly strengthen the technical rationale behind early SuDS assumptions.

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Flood Maps for Planning

The Flood Map for Planning is a critical tool provided by the Environment Agency (EA) used by developers, planners and architects to determine the flood risk of a specific site in England. It is specifically designed for planning applications.

Unlike 'long-term flood risk' maps which tell you if your current house/site might flood, this map helps you decide if you are allowed to build something new and what SuDS (Sustainable Drainage Systems) you will need to include.

The map classifies every piece of land into 'Flood Zones' based on the annual probability of flooding from rivers and the sea, ignoring any existing flood defences.

The Three Main Flood Zones

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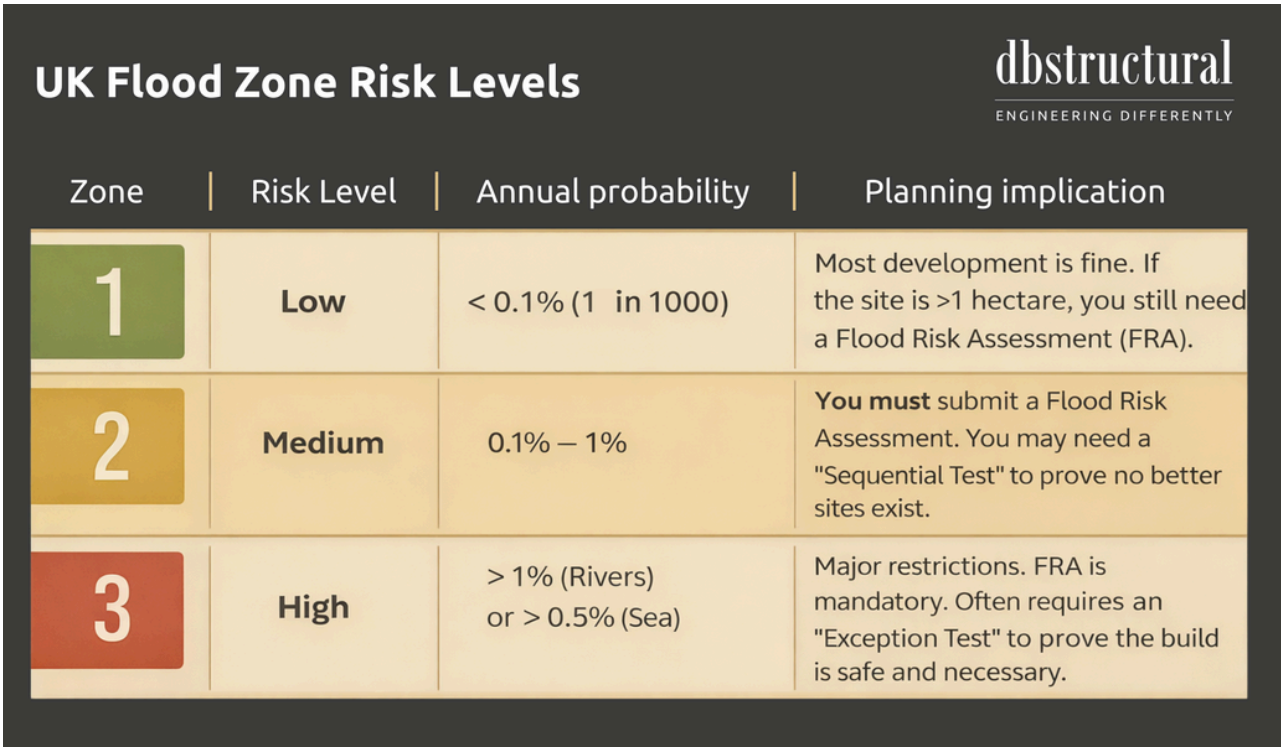

Why it matters for SuDS

The Environment Agency and Local Planning Authorities (LPAs) use this map to set the rules for your drainage design:

Mandatory SuDS
If your site falls in Zone 2 or 3, or is a major development in Zone 1, you are almost always required to submit a Sustainable Drainage Strategy.

Climate Change (2025/2026 Update)
Recent updates to the service now include a 'Flood Zones plus Climate Change' layer. This shows how Zones 2 and 3 are expected to expand over the next 100 years. Your SuDS must be designed to handle these future, more intense rainfall events.

Surface Water Risk
While the primary zones focus on rivers/sea, the service now includes a Surface Water layer. This is vital for SuDS because it shows where rainwater naturally 'pools' on the ground, essentially telling you where you should avoid building and where you might want to place a SuDS pond.

What to do next

1. Search your postcode: Locate your specific plot.
2. Download the 'Flood Map for Planning (PDF)': This official document is required as part of your planning submission.
3. Check for 'Critical Drainage Areas': Some local councils (especially in London, Devon, and Cornwall) have extra rules if you are in a designated high-risk drainage area, even if you are in Zone 1.

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Existing drainage records (asset plans)

Asset plans (also known as Sewer Records or Public Sewer Maps) are official documents provided by water companies that show the location and technical details of the infrastructure they maintain. These plans are essential for identifying where you can connect new drainage or where you are restricted from building.

Understanding the records

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Feature	Details Provided
Pipe Type	Clearly distinguishes between Foul (wastewater from toilets/sinks), Surface Water (rainwater), and Combined (both).
Location & Direction	The approximate route of the pipes and an arrow indicating the direction of flow.
Pipe Size & Material	The internal diameter (e.g., 150mm, 225mm) and often the material (e.g., Vitrified Clay (VC), Concrete, or PVC).
Manholes	Marked as circles or squares, often with a unique reference number.
Levels (if available)	Cover Level (CL): Height of the manhole lid above sea level. Invert Level (IL): The height of the bottom of the pipe (crucial for calculating gravity flow).

Existing drainage records cont.

Important Limitations

Accuracy
Maps are often ‘indicative’. You are usually required to perform a trial hole or a CCTV survey to find the exact position and depth before building.

Private Pipes
The plans generally do not show private drains that serve only one property within its own boundary.

‘Build-over’ Restrictions
If a plan shows a public sewer running through your garden, you generally cannot build an extension over it without a formal Build-Over Agreement from the water company.

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BRE 365 infiltration test

A BRE 365 Infiltration Test (based on BRE Digest 365) is the UK's industry-standard field test used to determine if the ground can absorb enough water to support a soakaway or other infiltration-based SuDS.

It is much more rigorous than a simple 'perc test' used for septic tanks, as it is designed to simulate how the ground will behave during a heavy, repeated rainstorm.

The Testing Process

The test follows a strict '3-fill' methodology to ensure the soil is fully saturated:

1. The Pit: A trial pit is excavated to the exact depth of the proposed soakaway (typically 1.0m to 2.0m deep).
2. The Fill: The pit is filled rapidly with water (usually from a water bowser, as a garden hose is too slow) to the intended "pipe entry" level.
3. The Timing: Engineers measure the time it takes for the water to fall from 75% full to 25% full.
4. The Repetition: This process must be repeated three times in the same pit, often over consecutive days. This accounts for the soil becoming saturated, which is when most soakaways fail.

Why is the test so important for Planning?

The "V-Value" (Infiltration Rate): The result provides a specific "f-value". Engineers use this number to calculate exactly how large your soakaway needs to be.

The Half-Empty Rule
To pass the test for UK Building Regulations, the soakaway must be able to drain from full to half-empty within 24 hours. This ensures it has capacity for a second storm the following day.

Evidence for the Hierarchy
If you want to connect to a sewer (Level 4 of the hierarchy), the Lead Local Flood Authority (LLFA) will usually demand a 'failed' BRE 365 report as proof that the ground is too clay-heavy to absorb water.

Essential Constraints

- Location: The test must be carried out at least 5m away from any building and 2.5m from a boundary to protect foundations.

- Groundwater: The base of your proposed soakaway must be at least 1m above the highest seasonal groundwater level. If the pit hits water during the test, it is an automatic fail for infiltration.

Next steps

Once all of this information has been collected, a fully detailed SuDs strategy can be developed for your site. If all the information is not available, or the Client does not want to commit to too many costs pre-planning, reasonable assumption can be made based on the publicly available information and local site knowledge.

> Working with dbstructural was an excellent experience from start to finish. Their team provided clear, practical design solutions that made the structural and drainage elements come together seamlessly. The end result was a well-detailed design that made the build straightforward.
>
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