

Cambridgeshire County Council Surface Water Guidance

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1. Sustainable Drainage Systems (SuDS)

Surface water run-off should be controlled as near to its source as possible through a sustainable drainage approach to surface water management.

SuDS are an approach to managing surface water run-off which seeks to mimic natural drainage systems and retain water on or near the site as opposed to traditional drainage approaches which involve piping water off site as quickly as possible. SuDS involve a range of techniques including soakaways, infiltration trenches, permeable pavements, grassed swales, ponds and wetlands. SuDS offer significant advantages over conventional piped drainage systems in reducing flood risk by attenuating the rate and quantity of surface water run-off from a site, promoting groundwater recharge, and improving water quality and amenity.

The variety of SuDS techniques available means that virtually any development should be able to include a scheme based around these principles. This should not be a piecemeal use of a few techniques. A fully integrated system is essential.

Some SuDS options could require significant land take so it is essential that they are considered early on in the design process. SuDS solutions are also available for high density urban environments where space is at a minimum. It can be difficult to incorporate some options once the detailed development design is underway.

Figure 1 shows the SuDS management train which demonstrates managing water at source and provides a hierarchy of techniques for improving quality and quantity.

Techniques closer to the source are preferable.

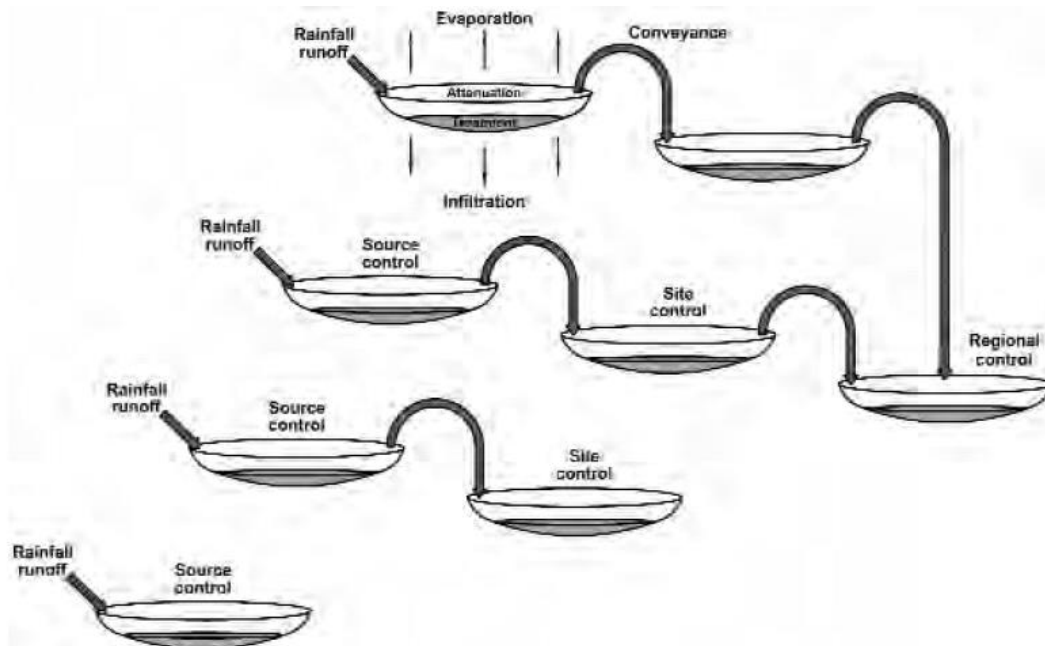


Figure 1 SUDS Management Train (Source: CIRIA C697 SuDS Manual)

Figure 2 shows the SUDS hierarchy with the most sustainable solutions at the top of the table.

Most Sustainable	SUDS technique	Flood Reduction	Pollution Reduction	Landscape & Wildlife Benefit
	Living roofs	✓	✓	✓
	Basins and ponds - Constructed wetlands - Balancing ponds - Detention basins - Retention ponds	✓	✓	✓
	Filter strips and swales	✓	✓	✓
	Infiltration devices - soakaways - infiltration trenches and basins	✓	✓	✓
	Permeable surfaces and filter drains - gravelled areas - solid paving blocks - porous paviers	✓	✓	
Least Sustainable	Tanked systems - over-sized pipes/tanks - storm cells	✓		

Figure 2 SUDS Hierarchy. (Source: Environment Agency Thames Region, 2006, *SUDS A Practical Guide*).

Further Information

- CIRIA 523 (SuDS Best Practice Manual)
- CIRIA 609 (SuDS – hydraulic, structural and water quality advice)
- CIRIA 697 (SuDS Manual)
- C687 (Planning for SuDS)
- CIRIA W12 (Sustainable Water management in Schools)
- CIRIA R156 (Infiltration Drainage – Manual of Good Practice)
- CIRIA C698 (SuDS Construction Guide)
- A future Flood & Water Supplementary Planning Document will be published, please keep an eye for updates within the Cambridgeshire County Council on this.

2. Planning Application Guidance

The application will need a surface water drainage strategy produced (possibly as part of an FRA if one is required) for all major development regardless of flood zone, that could potentially increase flood risk elsewhere through the addition of hard surfaces and the effect of the new development on surface water runoff should be incorporated.

An application for Outline planning permission should include details of one workable solution for managing surface water (this may alter at the detailed application stage). Applications for Full permission should also refer to Section 3 for what information will be required to discharge a condition.

The following is a list of the information needed for the Lead Local Flood Authority (LLFA) to recommend a surface water drainage condition. This is intended only as a starting point. It is critical to contact the LLFA to discuss any further – particularly local – flood risk issues.

1. Demonstrate how SuDS options have been considered. Refer to the SuDS management train and hierarchy and justify the chosen method(s) of surface water disposal (see Section 1).
2. Areas of permeable and impermeable land for both the existing site and the proposed development to be used to assess the change in surface water runoff. The site characteristics such as how surface water management is functioning on the site at present should be investigated.
3. Consideration should be given to sub-catchments which may exist on the site. Calculations for greenfield runoff rates for individual watercourses should be based on the proposed area of impermeable land within its sub-catchment. It may be possible to divert water to a different sub-catchment only if the greenfield runoff rate for that watercourse is not exceeded.
4. Establish the permitted discharge rate in accordance with the following information:

Undeveloped (Greenfield) Sites

- Written confirmation of the discharge rate as agreed by the receiving drainage body (i.e. Water Company or the Internal Drainage Board).
- For discharge into a main river or an ordinary watercourse outside of the Internal Drainage Board District, the discharge rate will be based on the calculated pre-development (greenfield) runoff rate for the site and

for a simple control structure will be based on the QBAR rate. This should be agreed in discussions with the LLFA.

- If complex controls are to be used for control of discharge rates, calculations for the greenfield runoff rate should be provided for the 1, 30 and 100 year return periods. The methodology in the EA/Defra document "[Preliminary Rainfall Runoff Management for Development](#) (W5-074/A/TR1) should be used as the basis for calculations.

Previously Developed (Brownfield) Sites

- Brownfield sites must discharge at the original pre-development (greenfield) rate where practicable. If not, a significant reduction in the current rate of discharge should be achieved and agreed with the relevant Drainage Body.
5. If discharging into an Ordinary Watercourse outside an IDB area an assessment of the offsite flow should be made. Further information will be required as to whether the watercourse will be able to convey the proposed discharge rate and volume if it is known to be susceptible to increased discharge or, has a history of flooding problems.
 6. If proposing to discharge to soakaways then percolation tests should be submitted in accordance with BRE Digest 365 or CIRIA guidance R156.
 7. An assessment of the volume of attenuation storage that will be required on site. This should be based on the 100 year critical storm duration with climate change for the site (see Pg. 10-13 [Technical Guidance](#) to the National Planning Policy Framework for appropriate climate change allowances) and the allowable discharge rate. Flood Studies Report (FSR) rainfall data should be used for storm durations less than 1 hour and Flood Estimation Handbook (FEH) rainfall data should be used for storm durations greater than 1 hour when identifying the critical storm duration. The method of attenuation should be identified and located on a plan of the site.
 8. An assessment of the need for long term storage. This will address the additional volume of runoff generated by the development. See the EA/Defra document "[Preliminary Rainfall Runoff Management for Development](#)" (W5- 074/A/TR1) for further information. The need for this provision will vary between sites so contact the LLFA.

Further Information

- Technical Guidance to the National Planning Policy Framework
- R&D Technical Report W5-074/A/TR/1 Revision D, Preliminary rainfall

runoff management for developments.

- BRE Digest 365 (Soakaway Design)
- CIRIA 523 (SUDS Best Practice Manual)
- CIRIA 609 (SUDS – hydraulic, structural and water quality advice)
- CIRIA 697 (SUDS Manual)
- CIRIA R156 (Infiltration Drainage – Manual of Good Practice)
- A future Flood & Water Supplementary Planning Document will be published, please keep an eye on updates within the County on this.

3. Discharge of Surface Water Condition

The following list of information represents the likely minimum requirements of the Lead Local Flood Authority (LLFA) in order to recommend that the LPA discharges a surface water drainage condition. This is not an exhaustive list and further information may be requested to support the application. Information to discharge a condition should be submitted as one package in a Drainage Strategy rather than in piecemeal submissions.

1. Demonstrate how SUDS options have been considered. Refer to the SUDS management train and hierarchy and justify the chosen method of surface water disposal (see Section 1).
2. Areas of permeable and impermeable land for both the existing site and the proposed development to be used to assess the change in surface water runoff. The site characteristics such as how surface water management is functioning on the site at present should be investigated.
3. Establish the permitted discharge rate in accordance with the following information:

Undeveloped (Greenfield) Sites

- Written confirmation of the discharge rate as agreed by the receiving drainage body (i.e. Water Company or the Internal Drainage Board).
- For discharge into a Main River or an Ordinary Watercourse outside of the Internal Drainage Board District the discharge rate will be based on the calculated pre-development (greenfield) runoff rate for the site. For a simple control structure this will be based on the QBAR rate. This should be agreed in discussions with the LLFA.
- If complex controls are to be used for control of discharge rates calculations for the greenfield runoff rate should be provided for the 1, 30 and 100 year return periods. The methodology in the EA/Defra document ["Preliminary Rainfall Runoff Management for Development \(W5-074/A/TR1\)"](#) should be used as the basis for calculations.

Previously Developed (Brownfield) Sites

- Brownfield sites are strongly encouraged to discharge at the original pre-development (greenfield) rate where possible. If not, a significant reduction in the current rate of discharge should be achieved and agreed with the relevant Drainage Body.
4. If discharging into an Ordinary Watercourse outside an IDB area make an assessment of the route which the water will take when leaving the site. Further information may need to be provided on whether the watercourse

will be able to convey the proposed discharge rate and volume if it is known to be sensitive to increased discharge or has had past flooding problems.

5. Discharge into any watercourse will need to consider whether the velocity of the discharge causes any erosion impacts on the channel. Effects of erosion downstream of the discharge point should also be considered.
6. If proposing to discharge to soakaways, percolation tests should be submitted in accordance with BRE Digest 365 or CIRIA guidance R156.
7. An assessment of the volume of attenuation storage that would be required on site. This should be based on the 100 year critical storm duration with climate change for the site (see Pg. 10-13 [Technical Guidance](#) to the National Planning Policy Framework for appropriate climate change allowances) and the allowable discharge rate. Flood Studies Report (FSR) rainfall data should be used for storm durations less than 1 hour and Flood Estimation Handbook (FEH) rainfall data should be used for storm durations greater than 1 hour when identifying the critical storm duration. The method of attenuation should be identified and located on a plan of the site.
8. An assessment of the need for Long Term Storage. This will address the additional volume of runoff generated by the development. See the EA/Defra document "[Preliminary Rainfall Runoff Management for Development](#)" (W5-074/A/TR1) for further information. The need for this provision will vary between sites so contact the LLFA for advice before commencing the assessment.
9. Fully labelled network diagram showing all dimensions (pipe numbers, gradients, sizes, locations, manhole details etc.) of every element of the proposed drainage system (pipes, swales, storage areas, ponds, etc). A hard copy of the network details should also be submitted.
10. Calculations to show the performance of the system:
 - FSR rainfall data should be used for storm durations less than 1 hour and FEH rainfall data should be used for storm durations greater than 1 hour.
 - Calculations for the 30 year rainfall event identifying the critical storm duration for the network considering a range of summer and winter storm durations from 15 minutes up to the 10080 minute (7 day) duration. No above ground flooding should occur for this event.
 - Calculations for the 100 year rainfall event including an allowance for climate change – increase on peak rainfall intensity (see Pg. 10-13 [Technical Guidance](#) to the National Planning Policy Framework for

appropriate climate change allowances). This should identify the critical storm duration for the network considering a range of summer and winter storm durations from 15 minutes up to the 10080 minute (7 day) duration.

- Some short term above ground flooding may be permitted for the 100 year event with climate change. Floodwater should be managed to be safe and not enter any buildings or disrupt emergency access routes. The volumes, depths, velocity and extent should be mapped on a topographical plan of the site. If flooding is extensive the hazard should be considered in line with guidance from the EA/Defra document '[Flood Risk Assessment Guidance for New Development](#)' (FD 2320/TR2) table 13.1.
 - Details of any online or offline control structures to be used such as complex controls or vortex flow controls or attenuation ponds.
 - Consideration of a surcharged outfall. The standard default setting of many surface water computer modelling programmes assumes a freely discharging outfall. Careful consideration is required and evidence provided to demonstrate that this assumption is correct. In many circumstances an outfall maybe surcharged affecting its hydraulic capacity and impacting on the surface water network. A surcharged outfall is likely to occur if discharging into a watercourse or surface water network near capacity. In these scenarios and with the absence of supporting information to the contrary it is expected the surface water calculations will assume a surcharged outfall.
 - It is important that the above calculations and input data are submitted as a hard copy.
11. If it is proposed to raise any land levels on site, the surface water strategy should consider the effect this could have on runoff leaving the site and affecting third parties. The most appropriate solution(s) to prevent this will need to be assessed.
12. Details of the party/parties responsible for the long term management of every element of the proposed drainage system.
13. A Summary report to include:
- The methodology applied in the calculations for the scheme. This should include the global variables and any assumptions used.
 - An explanation of how the system operates.
 - An assessment of the route the water will take when leaving the site and whether the receiving watercourse or sewer network will be able to convey the proposed discharge.

Further Information

- R&D Technical Report W5-074/A/TR/1, Preliminary rainfall runoff management for developments – refer to the most up to date Revision.

- R&D Technical Report FD 2320/TR2, Flood Risk Assessment Guidance for New Development.
- BRE Digest 365 (Soakaway Design)
- CIRIA 523 (SUDS Best Practice Manual)
- CIRIA 609 (SUDS – hydraulic, structural and water quality advice)
- A future Flood & Water Supplementary Planning Document will be published, please keep an eye on updates within the County on this.

Contact Information

In order that any pertinent – particularly local – issues are addressed, it would be appropriate to contact Cambridgeshire County Council's Flood and Water Team by email fr.planning@cambridgeshire.gov.uk