

3.7 Sustainable Drainage Systems and flood risk

- 3.7.1 Sustainable drainage systems (SuDS) re-create the benefits of natural drainage systems by integrating water management into the design of new developments to create and enhance the public realm, streets and open spaces that we all value. SuDS allow for the delivery of high quality surface water drainage whilst at the same time supporting the growth of the Greater Cambridge area and enabling the area to cope with severe rainfall, enhancing the adaptive capacity of the area. Policies within the 2018 Cambridge and South Cambridgeshire Local Plan place the emphasis on the use of SuDS over traditional underground piped drainage systems.
- 3.7.2 This section of the SPD focuses on guidance for the implementation of SuDS policy in the Cambridge Local Plan (2018). This guidance supplements the wider guidance on flooding and drainage provided for in the [Cambridgeshire Flood and Water SPD](#). For applications in South Cambridgeshire, further guidance on policy implementation, alongside drainage checklists, is provided in the [Cambridgeshire Flood and Water SPD](#).

LOCATION:	Cambridge
POLICY:	Policy 31: Integrated water management and the water cycle Policy 32: Flood risk (criterion a. and b.)
SCALE OF DEVELOPMENT:	All scales of development
TYPE OF DEVELOPMENT:	Residential and Non-residential development
SUBMISSION REQUIREMENTS:	<ol style="list-style-type: none">1. Surface Water Drainage Strategy; and2. A Site Specific Flood Risk Assessment is required:<ul style="list-style-type: none">• For proposals of 1 ha or greater in Flood Zone 1• For all proposals for new development (including minor development and change of use) in Flood Zones 2 and 3; or• In an area within Flood Zone 1 which has critical drainage problems; or• Where proposed development, or a change of use to a more vulnerable class, may be subject to other forms of flooding (for example if a proposed development is in an area of significant surface water flood risk)⁴⁸.
LINK TO THE SUSTAINABILITY CHECKLIST:	SuDS.1

Policy context

- 3.7.3 Policy 31 of the Cambridge Local Plan (2018) was developed in response to the high level of surface water flood risk facing Cambridge. Evidence contained in the Surface Water

⁴⁸ For further guidance on Site Specific Flood Risk Assessments see: <https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications>

Management Plan⁴⁹ and Strategic Flood Risk Assessment for Cambridge⁵⁰ has found there is little or no capacity in our rivers and watercourses that eventually receive surface water run-off from Cambridge and that it needs to be adequately managed so that flood risk is not increased elsewhere. As a result all scales of new development needs to utilise SuDS in order to reduce the rate of discharge into these watercourses and hence mitigate the risk of surface water flooding. This approach differs from national policy in that it applies the requirement for SuDS to all scales of development, recognising the cumulative impact that development in an urban context has on flood risk.

- 3.7.4 Chapter 6 of the Cambridgeshire Flood and Water SPD sets out further guidance on how to integrate SuDS into the design of new developments. The purpose of this section of the Sustainable Design and Construction SPD is to provide additional guidance on implementation to supplement the Cambridgeshire Flood and Water SPD in light of the specific requirements set out in policy 31, including:
- A requirement for all flat roofs to be green or brown roofs (see section 3.4 of this SPD);
 - there is no discharge from the developed site for rainfall depths up to 5 mm of any rainfall event (Interception);
 - the run-off from all hard surfaces shall receive an appropriate level of treatment in accordance with Sustainable Drainage Systems guidelines, SUDS Manual (CIRIA C753), to minimise the risk of pollution;
 - All hard surfaces are to be permeable where practical.
- 3.7.5 In addition to the above, policy 32 (flood risk), includes the following requirements:
- a. the peak rate of run-off over the lifetime of the development, allowing for climate change, is no greater for the developed site than it was for the undeveloped site;
 - b. the post-development volume of run-off, allowing for climate change over the development lifetime, is no greater than it would have been for the undeveloped site. If this cannot be achieved then the limiting discharge is 2 litre/s/ha for all events up to the 100-year return period event⁵¹;
 - c. the development is designed so that the flooding of property in and adjacent to the development would not occur for a 1 in 100 year event, plus an allowance for climate change and in the event of local drainage system failure;
 - d. the discharge locations have the capacity to receive all foul and surface water flows from the development, including discharge by infiltration, into water bodies and into sewers;
 - e. there is a management and maintenance plan for the lifetime of the development, which shall include the arrangements for adoption by any public authority or statutory undertaker and any other arrangements to secure the operation of the scheme throughout its lifetime; and
 - f. the destination of the discharge obeys the following priority order:

⁴⁹ Cambridge and Milton Surface Water Management Plan (2011), Cambridgeshire Flood Risk Partnership

⁵⁰ Cambridge and South Cambridgeshire Level 1 Strategic Flood Risk Assessment (2010)

⁵¹ Where the pre-development peak rate of run-off for the site would result in a requirement for the post-development flow rate to be less than 5 litre/s at a discharge point, a flow rate of up to 5 litre/s may be used where required to reduce the risk of blockage. If discharge is to be pumped then this allowance does not apply.

- firstly, to ground via infiltration;
- then, to a water body;
- then, to a surface water sewer.

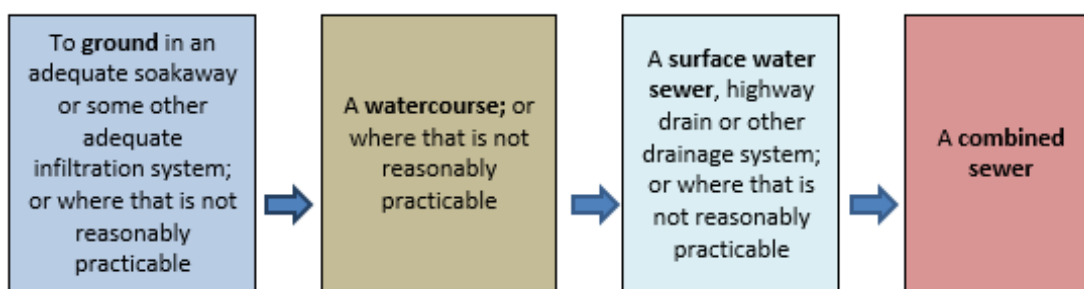
Discharge to a foul water or combined sewer is unacceptable.

- 3.7.6 In order for these requirements to be met, it will be important to ensure that the drainage requirements of a site are considered from the outset of the design of new developments. The layout and scale of development should be informed by the surface water drainage requirements and not vice versa.

Submission requirements

- 3.7.7 In order to demonstrate compliance with the requirements of policy 31, a **Surface Water Drainage Strategy** will need to be submitted. This document will then be assessed by Cambridge City Council's sustainable drainage engineers and/or Cambridgeshire County Council in their role as Lead Local Flood Authority. A Flood Risk Assessment will also be required for some sites, and further detail on the requirements related to this can be found in Chapter 4 of the [Cambridgeshire Flood and Water SPD](#) or the government website: <https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications>.
- 3.7.8 The Surface Water Drainage Strategy should set out how the proposed surface water scheme has been determined following the drainage hierarchy (see figure 11), and should include the following information:
- Pre-development runoff rates;
 - Post development runoff rates with associated storm water storage calculations in line with the requirements set out in paragraph 3.7.6 above;
 - Discharge location(s);
 - Drainage calculations to support the design of the system;
 - Drawings of the proposed surface water drainage scheme including sub catchment breakdown where applicable;
 - Maintenance and management plan of surface water drainage system (for the lifetime of the development) including details of future adoption;
 - Completed drainage proforma included within the [Cambridgeshire Flood and Water SPD](#) – the applicant must ensure that the surface water strategy contains the appropriate level of information in relation to the points covered in the proforma.
 - For householder applications, a more simplified summary of the information that needs to be submitted with applications is provided in the Government's standing advice for flood risk assessment, available online at: <https://www.gov.uk/guidance/flood-risk-assessment-standing-advice#what-to-include-in-your-assessment>.
- 3.7.9 SuDS must be shown on all relevant plans submitted, in order to demonstrate how SuDs integrate with planned public open spaces, landscaping, roads, trees and buildings. Plans should identify multifunctional SuDs, for example those which enhance biodiversity or improve water quality.

Figure 11: Surface water drainage hierarchy (adapted from the Cambridgeshire Flood and Water SPD)



Note: in all instances adequate stormwater storage will need to be provided in order that no properties are flooded at the 100 year event (with climate change) and there is no runoff from site from rainfall events less than 5mm depth.

3.7.10 All surface water drainage schemes should be underpinned by the following design principles in order to ensure that they offer effective drainage and are capable of being maintained for the lifetime of the development:

1. PERFORMANCE

- Reduce flood risk taking climate change into account. All development proposals in Cambridge should apply a 40% climate allowance to drainage calculations.
- Improve water quality
- Deliver biodiversity benefits to contribute to a net gain in biodiversity (see section 3.6)
- Provide amenity for residents

2. HIGH QUALITY DESIGN

- Micro managed bespoke design
- Integration with wider landscape setting
- Use of robust, low impact materials
- Designed to be attractive all year round

3. EASE OF MAINTENANCE

- Simple surface features
- Minimise use of grills and other engineered features
- Shallow gradients
- Robust appropriate planting for ease of maintenance but not at the expense of biodiversity (unless erosion prevention if a priority)
- A preference for outfalls to be gravity led unless certain site conditions apply. A pumped solution will only be considered acceptable if it can be clearly demonstrated that all other options are unfeasible. Where a pumped outfall is required, evidence will need to be submitted alongside the Surface Water Drainage Strategy to clearly demonstrate that the pumped system will be maintained, and where appropriate adopted by the relevant statutory undertaker, in perpetuity. The use of a pumped outfall should not prevent the use of upstream SuDS.

4. INTEGRATED APPROACH TO HEALTH AND SAFETY

- Easily identifiable features and risk

- Shallow gradients
- Planting and design used to create barriers where necessary

3.7.11 Use of these principles will form part of the Council's assessment of the proposed Surface Water Drainage Strategy.

3.7.12 While the primary overriding function of SuDS is to provide effective drainage, a SuDS design team should be multi-disciplinary and have:

- A strong landscape and urban design influence to guide the form and shape of the SuDS, especially in the early stages of the developments design;
- Drainage engineers with the expertise to ensure that the proposed design will provide effective drainage;
- Ecologists providing advice on how to maximise biodiversity benefits.

An effective SuDS team will work through these issues from early in the schemes development to find the most appropriate way to deal with any conflicting design aims.

Further guidance

3.7.13 For further guidance on the use and design of SuDS please see:

- Cambridgeshire Flood and Water SPD. Available online at: <https://www.cambridge.gov.uk/cambridgeshire-flood-and-water-spd>
- Cambridge City Council. Sustainable Drainage: Cambridge Design and Adoption Guide. Available online at: <https://www.cambridge.gov.uk/sustainable-drainage-systems-suds>
- CIRIA (2016). The SuDS Manual C753. Available online at: https://www.ciria.org/Resources/Free_publications/SuDS_manual_C753.aspx
- For more information on sustainable drainage systems, including case studies and a link to the **B**enefits **EST**imation Tool (BEST) for blue-green infrastructure see: <https://www.susdrain.org/>
- For the Susdrain developers hub see: https://www.susdrain.org/community/Developers_Hub