

National Standards for sustainable drainage systems

Designing, constructing, operating and maintaining drainage for surface runoff

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<http://www.defra.gov.uk/consult/>

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Executive Summary

- 0.1 This document presents the National Standards for Sustainable Drainage Systems (SuDS) for consultation.
- 0.2 SuDS are an approach to managing rainwater falling on roofs and other surfaces through a sequence of actions. The key objectives are to manage the flow rate and volume of surface runoff to reduce the risk of flooding and water pollution. SuDS also reduce pressure on the sewerage network and can improve biodiversity and local amenity.
- 0.3 The Department for Environment, Food and Rural Affairs (Defra) has developed National Standards to be used in England in order to manage surface runoff in accordance with Schedule 3 to the Flood Water and Management Act 2010.
- 0.4 The National Standards set out what to design and construct in order to obtain approval from the SuDS Approving Body (SAB) and for operating and maintaining SuDS which the SAB adopts.
- 0.5 Drainage for approval by the SAB must be designed to comply with the National Standards. The Sustainable Drainage (Approval and Adoption) (England) Order 2012 defines the exemptions to the requirement for approval.
- 0.6 There are two parts to the National Standards:
- Principles that:
 - i. Must be taken into account for the design of SuDS; and
 - ii. Set the criteria for governing the judgement of SABs on the functionality of drainage they adopt; and
 - iii. Exempt development from complying with certain aspects of the standards on the grounds of disproportionate cost.
 - Standards with design, construction and maintenance requirements for SuDS.
- 0.7 In addition, the Local Planning Authority may set local requirements for planning permission that have the effect of more stringent requirements than these National Standards.
- 0.8 Defra invites comments on the National Standards. An online questionnaire can be found at <http://www.defra.gov.uk/consult/>. The deadline for comments is **13 March 2012**.
- Responses can be sent by email to: SuDS@defra.gsi.gov.uk or
 - By post to: Defra, Ergon House, Area 2A, Horseferry Road, London, SW1P 2AL

Introduction

- 1.1 The Flood and Water Management Act 2010 requires new developments and redevelopments in England and Wales to have drainage plans for surface runoff approved by the SAB where the construction work would have drainage implications. The Sustainable Drainage (Approval and Adoption) (England) Order 2012 defines the exemptions to the requirement for approval.
- 1.2 The SAB is responsible for adopting and maintaining new SuDS that serve more than one property and have been constructed as approved and function as designed.
- 1.3 These National Standards set out the requirements for the design, construction, operation and maintenance of SuDS. There are two parts to the Standards:
 - Principles that:
 - i. must be taken into account for the design of SuDS; and
 - ii. set the criteria for governing the judgement of SABs on the functionality of drainage they adopt; and
 - iii. exempt development from complying with certain aspects of the standards on the grounds of disproportionate cost.
 - Standards with design, construction and maintenance requirements for SuDS.
- 1.4 The Local Planning Authority could set local requirements for planning permission that have the effect of more stringent requirements than these National Standards.
- 1.5 The National Standards are part of Governments policy for the construction of drainage for new developments and redevelopments, which includes the National Planning Policy Framework, Building Regulations and the Code for Sustainable Homes.
- 1.6 Guidance will be prepared to help interpret the National Standards and recommend approaches to comply with them.

Part I – Principles

- 2.1 A proposed drainage system does not comply with these National Standards unless it is designed so that:
- Surface runoff is managed at its source where it is reasonably practicable to do so;
 - Surface runoff is managed on the surface where it is reasonably practicable to do so;
 - Public space is used and integrated with the drainage system, where it serves more than one property and it is reasonably practicable to do so;
 - Design is cost-effective to operate and maintain over the design life of the development, in order to reduce the risk of the drainage system not functioning;
 - Design of the drainage system accounts for the likely impacts of:
 - climate change; and
 - changes in impermeable area;over the design life of the development, where it is reasonably practicable to do so.
- 2.2 Where arrangements have been made before seeking SAB approval, which do not take these Standards into account, this is not a reason to regard compliance as not reasonably practicable.

Affordability

- 2.3 If full compliance with the Standards would necessitate the construction of a drainage system that is more expensive than an equivalent conventional design then full compliance is not required, and instead the drainage system must comply with the standards to the greatest extent possible, without exceeding the cost of the equivalent conventional design.

Functionality

- 2.4 For the purposes of its duty to adopt a drainage system, a SAB:
- may carry out inspections in accordance with the conditions of approval and then may further consider the functionality of a drainage system for up to 8 weeks before it makes a judgement as to whether it is satisfied that the system is functioning; and
 - must presume that a drainage system is functioning in accordance with the approved proposals unless there is evidence that it is not.

Part II

Section A – Runoff destination

The following destinations must be considered for surface runoff in order of preference:

1. Discharge into the ground
2. Discharge to a surface water body
3. Discharge to a surface water sewer
4. Discharge to a combined sewer

- A1. Subject to complying with these National Standards, different destinations may apply for different parts of the site.

Discharge into the ground

- A2. Surface runoff must be discharged to the ground except where one or more of the following criteria can be demonstrated:
- a) The rate of surface runoff is greater than the rate at which water can infiltrate into the ground. In this case as much of the water as reasonably practicable must be discharged by infiltration; or
 - b) There is an *unacceptable risk*¹ of ground instability or subsidence; or
 - c) There is an unacceptable risk of pollution from mobilising existing contaminants on the site; or
 - d) Infiltration is not compliant with the water quality requirements (C7, C8); or
 - e) There is an unacceptable risk of groundwater flooding (D5); or
 - f) The infiltration system would create a high risk of groundwater leakage into the combined sewer.

Discharge to a surface water body

- A3. Surface runoff not discharged into the ground must be discharged to a surface water body except where it can be demonstrated that:
- a) It is not reasonably practicable to convey the runoff to a surface water body; or

¹ The effects of subsidence will be unacceptably adverse or cannot be minimised through appropriate layout, ground treatment or structural design.

- b) Pumping of the surface runoff, either on site or further downstream, would be required and there is a reasonably practicable alternative; or
- c) Discharge would result in an unacceptable risk of flooding from the surface water body.

Discharge to a surface water sewer or local highway drain

- A4. Surface runoff that cannot be discharged into the ground or to a surface water body must be discharged to a surface water sewer or local highway drain, except where it can be demonstrated that it is not reasonably practicable to do so.

Discharge to a combined sewer

- A5. Surface runoff that cannot be discharged into the ground, a surface water body or a surface water sewer or local highway drain must be discharged to a public, combined sewer system.
- A6. Surface runoff must not be discharged to a separate foul sewer.

Section B – Peak flow rate and volume

Exceptions

- B1. B3 onwards does not apply to any surface runoff that is discharged:
 - a) By infiltration; or
 - b) To a coastal or estuarial water body; or
 - c) To an alternative water body where the SAB considers it appropriate to do so.

Low rainfall

- B2. There must be no discharge to a surface water body or sewer that results from the first 5mm of any rainfall event.

High rainfall

- B3. Either of the two approaches below must be used to manage the surface runoff discharge, unless B9 applies:

Approach 1: Restricting both the peak flow rate and volume of runoff

- B4. The peak flow rates for the:
 - a) **1 in 1 year rainfall event**; and

b) **1 in 100 year rainfall event;**

must not be greater than the equivalent **greenfield runoff rates** for these events. The **critical duration rainfall event** must be used to calculate the required storage volume for the **1 in 100 year rainfall event**.

- B5. The volume of runoff must not be greater than the **greenfield runoff volume** from the site for the **1 in 100 year, 6 hour rainfall event**.

Approach 2: Restricting the peak flow rate

- B6. The **critical duration rainfall event** must be used to calculate the required storage volume for the **1 in 100 year rainfall event**. The flow rate discharged:

a) For the **1 in 1 year event**, must not be greater than either:

- the **greenfield runoff rate** from the site for the **1 in 1 year event**, or
- 2 litres per second per hectare (l/s/ha);

And b) for the **1 in 100 year event**, must not be greater than either:

- the **greenfield mean annual flood** for the site, or
- 2 litres per second per hectare (l/s/ha).

Previously developed land

- B7. Where the site is on previously developed land and neither Approach 1 nor 2 is reasonably practicable then:

a) An approach as close to Approach 1 as is reasonably practicable must be used;

b) The flow rate discharged from the site must not exceed that prior to the proposed development for:

- the **1 in 1 year event**; and
- the **1 in 100 year event**.

c) The volume of runoff may only exceed that prior to the proposed development where the peak flow rate is restricted to 2 l/s/ha.

Section C – Water Quality

Exceptions

- C1. C2 onwards does not apply to any surface runoff that is drained to a combined sewer provided that appropriate measures are included to manage the risk of discharging oil and sediments to the sewer.

Effective Treatment

C2. Water quality treatment components must be designed to ensure that they function effectively and the design of the drain must make use of an environment that incorporates and supports plants where reasonably practicable.

C3. The minimum number of treatment stages depends on the potential hazards on the site and are characterised in Table C1; together with the sensitivity of the receiving water body to pollution as categorised in Table C2 and C3.

C4. Where the sensitivity of the potential hazards and sensitivity of the receiving water body requires a level of treatment which is not reasonably practicable, then a lesser level of treatment must be considered.

C5. The discharge of surface runoff from a site categorised as high hazard as set out in Table C1 may not be permitted. It is advisable to consult the Environment Agency about environmental permitting to determine whether a permit is required. If a site is categorised as high hazard but a permit is not required then it is treated as a med hazard.

Hazard	Table C1: Level of hazard
Low	Roof drainage
Med	Residential, amenity, commercial, industrial uses includes car parking and roads
High	Areas used for handling and storage of chemicals and fuels, handling and storage of waste. This includes scrap-yards. Lorry, bus or coach parking or turning areas

Groundwater

C6. A series of treatment stages must be included before the surface runoff reaches the infiltration device. The minimum number of treatment stages must be in accordance with Table C2.

Table C2. Minimum number of treatment stages		low	med	high
G1	Source Protection Zone I, within 50m of a well, spring or borehole that supplies potable water.	1	3	Consult the EA (C6)
G2	Into or immediately adjacent to a sensitive receptor that could be influenced by infiltrated water. Includes designated nature conservation, heritage and landscape sites – including Biodiversity Action Plan (BAP) habitats and Protected Species.	1	3	
G3	Source Protection Zone II or III or Principal Aquifer	1	3	
G4	Secondary Aquifer	1	2	

G5	Unproductive strata	1	2	
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Infiltration

- C7. Surface runoff from roof drainage must be isolated from others sources and must not be significantly contaminated where it is discharged to G1 and G2 in accordance with Table C2.
- C8. Infiltration may only be used to discharge to G1 and G2 in accordance with Table C2 where a risk assessment has been undertaken and the design effectively addresses the risk(s) identified.

Surface Water Body

- C9. The minimum number of treatment stages required in series prior to the discharge of surface runoff to a surface water body or surface water sewer must be in accordance with Table C3. The table stipulates where discharge to a *sensitive surface water body*² then one extra treatment stage must be added.

Table C3: Minimum number of treatment stages to surface water		
Hazard	Normal surface water	Sensitive surface water
low	0	1
med	2	3
high	Consult the EA (C6)	

Section D - Function

Design

- D1. The drainage system and associated structures must be designed to ensure they function under anticipated loading conditions over the design life of the development.
- D2. The conveyance of surface runoff must minimise erosion of soil.
- D3. As far as reasonably practicable the design of the drainage system must minimise the use of energy over its design life. Pumping must only be used to facilitate drainage for those parts of the site where it is not reasonably practicable to drain water by gravity.

² Any catchment smaller than 50km²; any catchment with less than 20% urbanisation; any catchment with an environmental designation of national or international recognition, or any catchment where good ecological status is at risk.

Flood Risk

- D4. The design of the drainage system must take into account the impact of rainfall falling on any part of the site and also any estimated surface runoff flowing onto the site from adjacent areas.
- D5. Drainage systems must be designed so that, unless an area is designated for flood management in the Local Flood Risk Management Strategy, flooding from the drainage system does not occur:
- a) On any part of the site for a **1 in 30 year rainfall event**; and
 - b) During a **1 in 100 year rainfall event** in any part of:
 - a building (including a basement); or
 - utility plant susceptible to water (e.g. pumping station or electricity sub-station); or
 - c) On neighbouring sites during a **1 in 100 year rainfall event**.
- D6. Flows that exceed the criteria in Standard D5 must be managed in flood conveyance routes that minimise the risks to people and property both on and off the site.

Operation & Maintenance

- D7. The approved drainage plan must include the safe operation and maintenance of SuDS. Where appropriate this must make provision for a warning system and contingency arrangements.
- D8. Maintenance must be carried out safely in accordance with the approved drainage plan to maintain the designed function of SuDS.

Information

- D9. The approved plan must be provided to responsible parties, which identifies the measures to maintain the designed function.