

North Yorkshire County Council SuDS Design Guidance

| | |
|--|----------|
| 1. Introduction | 1 |
| 2. SuDS | 1 |
| 3. The Management Train | 1 |
| 4. Design Principles | 2 |
| 4.1 Runoff Destinations | |
| 4.2 Flood Risk | |
| 4.3 Peak Flow Control | |
| 4.4 Volume Control | |
| 4.5 Pollution Control | |
| 4.6 Designing for Exceedence | |
| 4.7 Highway Drainage | |
| 4.8 Climate Change | |
| 4.9 Urban Creep | |
| 5. Construction | 4 |
| 6. Maintenance Requirements | 5 |
| 7. SuDS Components | 6 |
| 7.1 Rainwater harvesting | |
| 7.2 Water Butts | |
| 7.3 Green Roofs | |
| 7.4 Permeable Surfacing | |
| 7.5 Infiltration | |
| 7.6 Filter Drain | |
| 7.7 Filter Strips | |
| 7.8 Swales | |
| 7.9 Inlets and Outlets | |
| 7.10 Detention Basins | |
| 7.11 Infiltration Basins | |
| 7.12 Ponds | |
| 7.13 Wetlands | |
| 7.14 Geocellular/Modular Systems | |
| 7.15 Pipes, Subsurface Drainage and Storage | |
| 7.16 Bioretention Systems | |
| 7.17 Silt Removal Devices | |
| 7.18 Separators/Interceptors | |
| 7.19 Pumping Stations | |
| 7.20 Conventional Drainage | |
| 8. Planning Application Requirements | 9 |
| 8.1 Outline Planning Application | |
| 8.2 Full Planning Application, Reserved Matters, Discharge of Conditions | |

1. Introduction

Local planning policies and decisions on planning applications relating to **major development** (developments of 10 dwellings or more or equivalent non-residential or mixed development as defined in section 2 of the Town and Country Planning (Development Management Procedure) (England) Order 2015) must ensure that sustainable drainage systems (SuDS) for the management of surface water runoff are put in place unless demonstrated to be inappropriate.

This guidance note details the requirements of North Yorkshire County Council in its capacity as the Lead Local Flood Authority (LLFA). It provides direction to the relevant design guidance for the successful implementation of SuDS and is the basis on which planning consultations from Local Planning Authorities will be assessed.

2. SuDS

Sustainable drainage systems (SuDS) mimic natural drainage patterns and provide water quantity (flooding), water quality (pollution), amenity and biodiversity benefits.

The SuDS Manual C753 [Published by CIRIA www.ciria.org] provides guidance on the planning, design, construction and maintenance of SuDS; available at www.susdrain.org/resources/ciria-guidance.html

See also:

- Rainfall Runoff Management for Developments <https://www.gov.uk/government/publications/rainfall-runoff-management-for-developments>
- Susdrain the community for sustainable drainage www.susdrain.org
- UK SuDS Tools Web site - HR Wallingford www.uksuds.com
- BS8582:2013 Code of Practice for Surface Water Management for Development Sites.
- Building Regulations 2010 Section H3 Rainwater Drainage 2015 edition http://www.planningportal.gov.uk/uploads/br/BR_PDF_AD_H_2015.pdf
- DEFRA Non-Statutory Technical Standards for Sustainable Drainage Systems https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/415773/sustainable-drainage-technical-standards.pdf
- Local Authority SuDS Officer Organisation (LASOO) Non-Statutory Technical Standards for Sustainable Drainage Practice Guidance <http://www.lasoo.org.uk/non-statutory-technical-standards-for-sustainable-drainage>

3. The Management Train

A concept fundamental to implementing a successful SuDS scheme is the management train. This is a sequence of SuDS components that serve to reduce runoff rates and volumes and reduce pollution. The hierarchy of techniques to be used is:

| | |
|-------------------------|--|
| Prevention | Prevention of runoff by good site design and reduction of impermeable areas. |
| Source Control | Dealing with water where and when it falls (e.g. infiltration techniques). |
| Site Control | Management of water in the local area (e.g. swales, detention basins). |
| Regional Control | Management of runoff from sites (e.g. balancing ponds, wetlands). |

- See CIRIA C753 The SuDS Manual *Chapters 1 and 2*

4. Design Principles

The three most important requirements are:

- **Ensure that people, property and critical infrastructure are protected from flooding.**
- **Ensure that the development does not increase flood risk off site.**
- **Ensure that SuDS can be economically maintained for the lifetime of the development.**

Surface water runoff should be managed for maximum benefit.

4.1 Runoff Destinations

Surface water runoff not collected for use must be discharged to one or more of the following in the order of priority shown:

- a) Discharge into the ground (infiltration).
- b) Discharge to a surface water body.
- c) Discharge to a surface water sewer, highway drain or other drain.
- d) Discharge to combined sewer.

- See also The Building Regulations 2010 Part H Drainage and Waste Disposal 2015 Edition

4.2 Flood Risk

The drainage system must be designed so that, unless an area is designed to hold and/or convey water, flooding does not occur on any part of the site for a 1 in 30 year rainfall event. Calculations must include an allowance for urban creep where required and climate change.

The drainage system must be designed so that, unless an area is designed to hold and/or convey water, flooding does not occur during a 1 in 100 year rainfall event in any part of a building (including a basement) or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development. Calculations must include an allowance for urban creep where required and climate change.

The design of the site must ensure that flows resulting from rainfall in excess of a 1 in 100 year rainfall event are managed in exceedence routes that avoid risk to people and property both on and off site.

4.3 Peak Flow Control

The peak runoff rate from the developed site for the 1 in 1, 1 in 30 and 1 in 100 year rainfall events to include for urban creep where required and climate change must not exceed the peak greenfield runoff rate from the site for the same event.

Greenfield runoff rate is to be determined using the Institute of Hydrology (IH) Report 124 or Flood Estimation Handbook (FEH) methods. This is detailed in the publication Rainfall Runoff Management for Developments Report SC030219 available at <https://www.gov.uk/government/publications/rainfall-runoff-management-for-developments>

For a whole or part brownfield site; greenfield runoff rate and/or 70% of demonstrable existing positively drained runoff rate for those rainfall events will be permitted however greenfield runoff rate should be achieved where possible.

Greenfield runoff rate is maximum 1.4 l/s/ha unless modelling conclusively demonstrates greenfield runoff to be greater than this.

- See CIRIA C753 The SuDS Manual *Chapter 3*

4.4 Volume Control

The runoff volume from the developed site for the 1 in 100 year 6 hour rainfall event must not exceed the greenfield runoff volume for the same event.

For a whole or part brownfield site, greenfield runoff volume and/or 70% of demonstrable existing positively drained runoff volume for those rainfall events will be permitted however greenfield runoff volume should be achieved where possible.

Should infiltration methods not be suitable and it is not possible to achieve greenfield runoff volume then it must be demonstrated that the increased volume will not increase flood risk on or off site.

- See CIRIA C753 The SuDS Manual *Chapter 3*
- See Rainfall Runoff management for Developments <https://www.gov.uk/government/publications/rainfall-runoff-management-for-developments>

4.5 Pollution Control

SuDS design must ensure that the quality of any receiving water body is not adversely affected and preferably enhanced.

- See CIRIA C753 The SuDS Manual *Chapter 4*
- See Ground Water Protection: Principles and Practice, The Environment Agency, Nov 2012, updated Aug 2013 available at www.gov.uk/government/publications/groundwater-protection-principles-and-practice-gp3

4.6 Designing for Exceedence

Site design must be such that when SuDS features fail or are exceeded, exceedence flows do not cause flooding of properties on or off site. This is achieved by designing suitable ground exceedence or flood pathways. Runoff must be completely contained within the drainage system (including areas designed to hold or convey water) for all events up to a 1 in 30 year event.

The design of the site must ensure that flows resulting from rainfall in excess of a 1 in 100 year rainfall event are managed in exceedence routes that avoid risk to people and property both on and off site.

- See CIRIA C635 Designing for Exceedence in Urban drainage - Good Practice

4.7 Highway Drainage

SuDS features within highways and that serve those highways can be adopted by North Yorkshire County Council Highway Authority and maintained as part of the wider highways maintenance subject to agreement of the Highway Authority. The incorporation of SuDS that involves highway drainage requires the developer either to enter into an agreement under Section 38 of the Highways Act, if involving new development, or an agreement under Section 278 of the Act, if existing highway arrangements are to be modified.

- See the Development Design Guides currently used in North Yorkshire <http://www.northyorks.gov.uk/article/25123/Roads---adoption-agreements>
- See the Design Manual for Roads and Bridges <http://www.standardsforhighways.co.uk/ha/standards/dmrb/index.htm>
- See CIRIA C753 The SuDS Manual *Chapter 9*

4.8 Climate Change

Due to changing climate, winters are likely to get wetter and we are likely to experience more extreme weather conditions such as intense rainfall events. As such, an allowance of 30% must be made in SuDS design for increased amounts of rainfall.

- See CIRIA C753 The SuDS Manual *Chapter 24*.
- See BS8582:2013 Code of Practice for Surface Water Management for Development Sites *Section 5*.

4.9 Urban Creep

Urban Creep describes future expansion within a development and activities such as building extensions and paving gardens. These activities increase the impermeable area of a site and often sit outside of the development control process. As such proposed developments must have an allowance for this increase in impermeable area of 10%.

- See BS8582:2013 Code of Practice for Surface Water Management for Development Sites *Section 8*.
- See CIRIA C753 The SuDS Manual *Chapter 24*.

5. Construction

Damage caused during the construction phase has the potential to prevent SuDS functioning as required, for example contamination by sediments generated during construction. As such appropriate planning must be applied to surface water management during the construction phase.

Should the SuDS not be proposed to be adopted by a Water and Sewerage Company, upon completion of construction the applicant shall supply all items listed in section 6.6 to North Yorkshire County Council to allow the authority in its capacity as the Lead Local Flood Authority to fulfil statutory requirements under section 21 of the Flood and Water Management Act 2010 with regard to keeping a register of and information about assets likely to affect flood risk.

- See BS8582:2013 Code of Practice for Surface Water Management for Development Sites *Section 10*.
- See C698 the Site handbook for the construction of SUDS available from www.susdrain.org/resources/ciria-guidance.html
- See CIRIA C753 The SuDS Manual *Chapter 31*.

6. Maintenance Requirements

Legislation requires that planning authorities ensure through the use of planning conditions or planning obligations that there are clear arrangements in place for ongoing maintenance of SuDS over the lifetime of the development. Maintenance requirements for proposed SuDS are to be agreed with the Local Planning Authority (LPA). The following options are available:

- 6.1 Adoption and maintenance of SuDS by the local Water and Sewerage Company** via a section 104 Water Industry Act agreement with that company.
- 6.2 Adoption and maintenance of SuDS by a management company.** It must be demonstrated to the satisfaction of the LPA that the maintenance arrangements and their funding will be in place for the lifetime of the development.
- 6.3 Maintenance of SuDS within property curtilages by the homeowner.** It must be demonstrated to the satisfaction of the LPA that maintenance will be ensured for the lifetime of the development.

As the LPA must ensure that there are clear arrangements in place for ongoing maintenance over the lifetime of the development it is not satisfactory to assume that homeowners and subsequent homeowners will be aware of the maintenance requirement and responsibility; further measures will be necessary. Those measures must be proposed by the applicant and may include, for example, information provided to the first purchaser of the property and also designation/registration of the SuDS so that it appears as a Land Charge for the property and as such is identified to subsequent purchasers of the property. Any methods involving designation or registering a Land Charge are to be agreed with the LPA.

- 6.4 Maintenance of SuDS within the curtilages of land by the commercial body or organisation that owns or occupies that land.** It must be demonstrated to the satisfaction of the LPA that the maintenance arrangements and their funding will be in place for the lifetime of the development.
- 6.5 Adoption and maintenance of SuDS by a local authority.** North Yorkshire County Council does not currently adopt SuDS with the exception of the Highway Authority that can adopt SuDS that serve the highway; adoption of highway SuDS must be agreed with the Highway Authority. The LPA may adopt SuDS; this must be agreed with that LPA.
- 6.6** Should the SuDS not be adopted by a Water and Sewerage Company the following must be provided:

- a) As built drawings and a maintenance and operation manual for all SuDS, including for single property SuDS. This must include physical access arrangements for maintenance and establishment of legal rights of access in perpetuity prior to the commencement of any phase of the development. A copy of a maintenance and operation manual for single property SuDS must be supplied to the relevant residents.
 - b) Details of the organisation responsible for the ongoing maintenance of the SuDS for the lifetime of the development.
 - c) Funding arrangements for SuDS maintenance. It must be demonstrated how the ongoing maintenance of the SuDS for the lifetime of the development will be funded.
 - d) Health and safety risk assessment for operation and maintenance of the SuDS
- See CIRIA C753 The SuDS Manual *Chapter 32*.
 - See BS8582:2013 Code of Practice for Surface Water Management for Development Sites *Section 11*.
 - See Susdrain – SuDS maintenance and adoption options (England).
http://www.susdrain.org/files/resources/fact_sheets/09_15_fact_sheet_suds_maintenance_and_adoption_options_england.pdf

7. SuDS Components

7.1 Rainwater harvesting

Systems that collect runoff from roofs or other impermeable surfaces and make it available for non-potable use.

- See CIRIA C753 The SuDS Manual *Chapter 11*.

7.2 Water Butts

These are small off-line storage devices and any attenuation provided by water butts is not to be taken into account when calculating site runoff.

- See CIRIA C753 The SuDS Manual *Chapter 11*.

7.3 Green Roofs

Green roofs cover the roof of a structure with a multi layered system to intercept and retain precipitation. Note that maintenance requirements must be given significant consideration.

- See CIRIA C753 The SuDS Manual *Chapter 12*.

7.4 Permeable Surfacing

Permeable surfacing can provide a suitable pavement for pedestrians and vehicular traffic while allowing surface water storage, conveyance and infiltration.

- See CIRIA C753 The SuDS Manual *Chapter 20*.
- See BS 7533-13:2009 Pavements constructed with clay, natural stone or concrete pavers. Guide for the design of permeable pavements constructed with concrete paving blocks and flags, natural stone slabs and setts and clay pavers.
- See Interpave, The Precast Concrete Paving and Kerb Association www.paving.org.uk

7.5 Infiltration

Soakaways can store surface water run-off and allow for its efficient infiltration into the adjacent soil. It must be demonstrated that the groundwater level at the site always remains a minimum of 1m below the base of any soakaway.

- See CIRIA C753 The SuDS Manual *Chapter 13*.
- See BRE Digest 365 Soakaway Design.

7.6 Filter Drain

Filter drains/trenches are trenches filled with aggregate that create subsurface storage and conveyance and can also allow infiltration.

- See CIRIA C753 The SuDS Manual *Chapter 16*.

7.7 Filter Strips

Filter strips are vegetated strips of land which treat runoff by filtering and the promotion of settlement of pollutants.

- See CIRIA C753 The SuDS Manual *Chapter 15*.

7.8 Swales

These are linear vegetated drainage features that convey and store surface water and provide pollutant treatment by allowing settlement.

- See CIRIA C753 The SuDS Manual *Chapter 17*.

7.9 Inlets and Outlets

Inlets and outlets, including vortex controls, orifice controls and weirs, provide hydraulic control and their design is an opportunity for a reduction in maintenance requirements.

- See CIRIA C753 The SuDS Manual *Chapter 28*.

7.10 Detention Basins

Detention basins use flow control and provide storage of runoff. They can also provide water quality benefits via the settlement of pollutants. Note that off-line normally dry detention basins can be adopted by the local Water and Sewerage Company with their agreement.

- See CIRIA C753 The SuDS Manual *Chapter 22*.

7.11 Infiltration Basins

Infiltration basins are vegetated depressions that allow storage of surface water and infiltration of that water.

- See CIRIA C753 The SuDS Manual *Chapter 13*.

7.12 Ponds

Ponds provide surface water storage and treatment benefits.

- See CIRIA C753 The SuDS Manual *Chapter 23*.

7.13 Wetlands

As ponds, wetlands provide both storage and treatment but on a larger scale. In addition, further ecological benefits can be obtained.

- See CIRIA C753 The SuDS Manual *Chapter 23*.

7.14 Geocellular/Modular Systems

Geocellular/modular systems are usually plastic systems that allow subsurface storage, conveyance and infiltration. Note that geocellular or modular systems are not acceptable in adopted highways and in private gardens. Maintenance requirements must be given significant consideration.

- See CIRIA C753 The SuDS Manual *Chapter 21*.

7.15 Pipes, Subsurface Drainage and Storage

- See the standards detailed in the latest published edition of Sewers for Adoption produced by WRc plc.

7.16 Bioretention Systems

Bioretention systems are landscaped depressions containing vegetation, engineered soils and often underdrainage to achieve storage and pollutant removal.

- See CIRIA C753 The SuDS Manual *Chapter 18*.

7.17 Silt Removal Devices

Silt removal devices are required to remove silt, sediment and debris from surface water runoff prior to runoff reaching downstream SuDS components. Appropriate design can result in reduced maintenance requirements.

- See CIRIA C753 The SuDS Manual *Chapter 26*.

7.18 Separators/Interceptors

Separators and interceptors are used to prevent hazardous chemical and petroleum products entering water bodies or drainage systems. Note that maintenance requirements must be given significant consideration.

- See CIRIA C753 The SuDS Manual *Chapter 14*.
- See Environment Agency Pollution Prevention Guidelines Use and Design of Oil Separators in Surface Water drainage Systems: PPG3.
- See BS EN 858-1:2002 Separator systems for light liquids (e.g. oil and petrol).

7.19 Pumping Stations

Surface water pumping stations should only be used where there is no other practicable method of surface water drainage and a suitable exceedance flowpath exists in the event of failure or exceedance of the pumping system.

- See the standards detailed in the latest published edition of Sewers for Adoption produced by WRc plc.
- See CIRIA C753 The SuDS Manual *Chapter 24*.

7.20 Conventional Drainage

- See the standards detailed in the latest published edition of Sewers for Adoption produced by WRc plc.

8. Planning Application Requirements

8.1 Outline Planning Application

It must not be assumed that SuDS can be dealt with as a reserved matter and at outline application stage it must be demonstrated that surface water can be successfully managed for the proposed development and not cause or increase flood risk both on or off site.

The applicant must provide information to demonstrate that the following requirements can be met:

| | |
|---------------------------------|-------------------|
| Runoff Destinations | (See section 4.1) |
| Flood Risk | (See section 4.2) |
| Peak Flow Control | (See section 4.3) |
| Volume Control | (See section 4.4) |
| Pollution Control | (See section 4.5) |
| Designing for Exceedence | (See section 4.6) |
| Highway Drainage | (See section 4.7) |
| Climate Change | (See section 4.8) |
| Urban Creep | (See section 4.9) |
| Maintenance | (See section 6) |

This will require but may not be limited to the following information:

- a) Site location and layout plans.
- b) Topographical survey of the existing site's catchment to include contours at 1m interval and existing surface water flow routes, drains, sewers and watercourses.
- c) Site plan showing areas of Main River, surface water and tidal flooding.
- d) Site Drainage Strategy to include:
 - Assessment of flood risk.
 - SuDS proposals to include preliminary layout.
 - Information to support the chosen runoff destination and reasons why any destinations of higher priority have not been proposed (*see section 4.1*).
 - Any outfall locations.
 - Flow rates and volumes of surface water discharge (*see sections 4.3 and 4.4*).
 - On-site storage requirements.
 - Preliminary site plan showing exceedence flow routes.
- e) Maintenance, funding and operation proposals for the SuDS (*see section 6*).

8.2 Full Planning Application, Reserved Matters, Discharge of Conditions

The applicant must provide information to demonstrate that the following requirements will be met:

| | |
|---------------------------------|-------------------|
| Runoff Destinations | (See section 4.1) |
| Flood Risk | (See section 4.2) |
| Peak Flow Control | (See section 4.3) |
| Volume Control | (See section 4.4) |
| Pollution Control | (See section 4.5) |
| Designing for Exceedence | (See section 4.6) |
| Highway Drainage | (See section 4.7) |
| Climate Change | (See section 4.8) |
| Urban Creep | (See section 4.9) |
| Construction | (See section 5) |
| Maintenance | (See section 6) |

This will require but may not be limited to the following information in addition to that submitted for an outline application:

- a) Infiltration test results where necessary.
- b) Drainage layout plan (to include SuDS, sewer, drains and watercourse).
- c) Proposed site plan showing exceedence flow routes.
- d) Design calculations as necessary to demonstrate the functionality of the SuDS.
- e) Details of the organisation responsible for the SuDS (*see section 6*).
- f) Details of funding arrangements for SuDS maintenance (*see section 6*).

- g) Detailed design drawings and construction details to include details of inlets and outlets and flow controls.
- h) Specification of materials.
- i) Cross sections including design levels.
- j) A condition survey of any existing drainage assets, infrastructure or watercourse to be utilised.
- k) Construction phase surface water management plan (*see section 5*).
- l) Maintenance and operation manual for the SuDS, to include physical access arrangements for maintenance and establishment of legal rights of access in perpetuity (if the SuDS is not to be adopted by a Water and Sewerage Company) (*see section 6*).
- m) Health and safety risk assessment for operation and maintenance of the SuDS (if the SuDS is not to be adopted by a Water and Sewerage Company) (*see section 6*).

Note that, dependent upon the complexity of the site and development proposals, on occasion items g to m may be conditioned as part of a planning approval and required for discharge of conditions. However, at discharge of conditions stage, should the requirements not have been approved as part of a full application the applicant is exposed to the risk of being unable to discharge the relevant planning condition.