1 SuDS Principles

1.1 Regulatory background

1.1.1 Relationship to LPA/LLFA

In England and Wales surface water drainage arrangements for new developments and redevelopments must be approved by the Local Planning Authority (LPA) in accordance with the relevant national planning guidance and any supplementary local policies and guidance with input from the Lead Local Flood Authority (LLFA) and, in critical drainage areas, from the Environment Agency as statutory consultees. National planning policy gives an expectation that SuDS should be used as first preference in developments of any size.

The designer should submit plans and calculations to show how the proposed design meets the requirements of the LPA, with details of how the system will be maintained in perpetuity. This is in addition to the requirements of a Flood Risk Assessment (FRA). This will normally be a copy of the submission made to the LPA.

SfA8 will specify which elements of the drainage system are potentially adoptable by a sewerage undertaker and under what conditions.

1.1.2 Flood and Water Management Act 2010

Schedule 3 of the Flood and Water Management Act 2010, if implemented, will change the regulatory arrangements, and depending on the extent and nature of the implementation could impact on SfA8. The Welsh Government are currently consulting on proposals to implement Schedule 3 and this will be kept under review during drafting.

1.2 Adoption criteria

1.2.1 Background

For a component to be considered for adoption by a sewerage undertaker, surface water drainage components must fall within the legal definition of a 'sewer' or 'lateral drain' in accordance with the Water Industry Act 1991. The adoption can also include components that come within the definition of an 'accessory' to a sewer or lateral drain in accordance with Water Industry Act 1991 Section 219(1).

The Water Industry Act 1991 makes provision for developers to requisition sewers and lateral drains. Any surface components that fall within the legal definition of a sewer or lateral drain in accordance with the Water Industry Act 1991 are also potentially capable of being requisitioned in accordance with the 1991 Act.

1.2.2 Principles

A SuDS component is potentially adoptable as a sewer (or lateral drain) if all of the following apply:

a) It is constructed for the drainage of buildings and yards appurtenant to buildings;
b) It has a channel (a depression between banks or ridges with a definite boundary);
c) Conveys and returns flows to a sewer or to the environment; and,
d) It has an effective outfall, which must have lawful authority to discharge into a watercourse or other water body (see EA's guide living on the edge
The following components are however excluded:

1. Watercourses as defined in law (these include rivers, streams and can include some ditches);
2. Components built for the drainage of surface water from roads or for the drainage of land;
3. Components built to manage groundwater;
4. Components which are part of the structure of a building or yard (e.g. green roof, permeable driveway or guttering and rainwater pipes attached to the building);
5. Components which are an integral part of the structure of a highway (e.g. a permeable road or the channel formed by the kerb of a conventional road or a channel formed by a depression in the centre of a road).

Guidance on whether pipes are sewers or lateral drains can be found on the Water UK website and is also applicable to determine whether SuDS components are potentially sewers or lateral drains.

**Definitions**

- **yard** means a surfaced construction associated with a building or buildings including a driveway, patio, hard standing or footpath.
- **highway** includes any footpath, bridleway, road (including both the footway and the carriageway).
- **pavement** means a surfaced construction (including a yard or highway) and any underlying structure.
- **pavement structure** comprises; the sub-base and any membrane below it, together with the layers above, including, base course surface course, binder course, laying course or paving layer.

**1.2.3 List of adoptable and unadoptable components**

Table 1 lists the types of SuDS components and whether they are potentially adoptable as sewers or lateral drains or not. If adoptable, they will need to meet the conditions listed below.

The definitions of the terms for components can be found in the CIRIA SuDS Manual (C753).

**Table 1 Potentially Adoptable Components**

<table>
<thead>
<tr>
<th>Component</th>
<th>Potentially adoptable</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pervious pavements</td>
<td>No</td>
<td>Pervious pavements are not sewers because:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>a) their prime function is to form the structure of the pavement that forms the yard or highway (see definition in 1.2.2); and</td>
</tr>
</tbody>
</table>
However, surface water that has passed through a pervious pavement may be discharged into a surface water sewer and a sewer may be laid under a pervious pavement, in the same way as it may be laid under any other paved surface, provided that it is not laid under a tank structure.

Green roofs are not sewers because:

a) their prime function is to be the roof of a building; and
b) they do not have a defined channel. Excess surface water (not lost through evapotranspiration) from green roofs may however be discharged into a sewer.

Filter strips are not sewers as they do not have a defined channel. However surface water that has passed over or through a filter strip may be discharged into a sewer.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green roofs</td>
<td>No</td>
<td>Green roofs are not sewers because:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>a) their prime function is to be the roof of a building; and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b) they do not have a defined channel.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Excess surface water (not lost through evapotranspiration) from green roofs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>may however be discharged into a sewer.</td>
</tr>
<tr>
<td>Filter strips</td>
<td>No</td>
<td>Filter strips are not sewers as they do not have a defined channel.</td>
</tr>
<tr>
<td>Swale (with or without an under-drain)</td>
<td>Yes</td>
<td>It must have an effective outfall (see Note 1).</td>
</tr>
<tr>
<td>Rill</td>
<td>Yes</td>
<td>It must have an effective outfall (see Note 1)</td>
</tr>
<tr>
<td>Bio-retention systems</td>
<td>Yes</td>
<td>It must have an effective outfall (see Note 1). This can take the form of a</td>
</tr>
<tr>
<td></td>
<td></td>
<td>properly designed means of infiltrating the water into the ground below or a</td>
</tr>
<tr>
<td></td>
<td></td>
<td>overflow to a sewer.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>It must have a channel (see Note 2). In this case a depression is an essential</td>
</tr>
<tr>
<td></td>
<td></td>
<td>feature of the bio-retention system and this forms the channel.</td>
</tr>
<tr>
<td>Basins/ Detention basins/Infiltration basins</td>
<td>Yes</td>
<td>It must have an effective outfall (see Note 1). This can be a properly designed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>means of infiltrating the water into the ground below.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>It must have a channel (see Note 2). In this case this will be the depression</td>
</tr>
<tr>
<td></td>
<td></td>
<td>between the banks of the basin.</td>
</tr>
<tr>
<td>Ponds (or Wetlands)</td>
<td>Yes</td>
<td>It must have an effective outfall (see Note 1).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>It must have a channel (see Note 2). In this case this will be the depression</td>
</tr>
<tr>
<td></td>
<td></td>
<td>between the banks of the pond.</td>
</tr>
<tr>
<td>Soakaway</td>
<td>Yes</td>
<td>Since a soakaway is a type of infiltration component that is essentially a point</td>
</tr>
<tr>
<td>Feature</td>
<td>Yes</td>
<td>Details</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>-----</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Infiltration trench/filter drain</td>
<td></td>
<td>There is a clear channel for water along the trench.</td>
</tr>
<tr>
<td>Pipe</td>
<td></td>
<td>It must have an effective outfall (see Note 1).</td>
</tr>
<tr>
<td>Tank</td>
<td></td>
<td>To be a sewer it must have a defined channel. This would be the case if it was an enlarged pipe, or a chamber with half pipe channels in the base of the tank. Alternatively it could be adoptable as an accessory to a sewer, however to be considered as such it must be fed by an upstream channel that is legally a sewer or lateral drain.</td>
</tr>
</tbody>
</table>

**Notes:**

1) An effective outfall is one which is both designed as an outfall and for which there is a legal right to discharge. This can be another sewer, or provided there is a legal right to discharge, a watercourse, an area of land or an infiltration drainage component (see 1.2.2).

2) A defined channel is a depression between banks or ridges with a definite boundary.

### 1.2.4 What constitutes to adopted asset?

Adoption provides statutory rights for the sewerage undertaker to exercise its powers and duties under the legislation upon the land where the component is situated. For a pipeline, the adopted component is usually considered to be the pipe, but not any of the surrounding ground. For SuDS components, the boundary is to be determined and approved by the sewerage undertaker prior to adoption.

The adoption will include any part of the component which is essential to its function. This can depend on local circumstances and will be defined in the agreement. It is not necessarily the same as the extent of any required land ownership (see 1.2.5).

Almost all the SuDS components listed above incorporate some form of vegetation. The vegetation can have a variety of roles. In these cases the adoption will include only the vegetation that is essential to its function as a drainage component.

Many SuDS components also include some sort of gravel/filter media. This should also be included in the adoption where it is functionally part of the asset.

Where land has shared use (e.g. a basin which is also used as public open space for sports or other amenity purposes), there must be an agreement in place with the developer or the body that will manage the other use that will include a specification of the maintenance responsibilities of each party. This will need to be agreed before development commences.

**Basins:** Adoption would normally include the inlet and outlet structures (including flow controls) and the entire area of the basin including any banks that are designed to retain water, any storage below the ground surface, impermeable liners and under drains.
Ponds: Adoption would normally include the inlet and outlet structures (including flow controls) and the entire area of the pond including any banks that are designed to retain water, any storage below the ground surface, impermeable liners and under drains.

Swales: Adoption would normally include the sides of the structure and any under-drainage including any liner, check dam, flow control or erosion control.

Rills: This is essentially an open topped pipe. Adoption would normally include the material forming sides and base of the rill.

Bio-retention systems: Adoption would normally include the whole area used for temporary ponding of water and the inlet and outlet structures and any engineered infiltration structures.

Soakaways: Adoption would normally include the whole structure up to the external face, including any external rubble fill or membrane.

Infiltration trench/filter drain: Adoption would normally include the whole structure up to the external face, including any pipework and rubble fill and any membrane.

1.2.5 Easements or Ownership of land

Adoption provides the sewerage undertaker with statutory rights in the land to provide access for them to perform their statutory duties (see 1.3.4). For pipe components, the presence of the pipe does not significantly restrict the use of the land and there is usually no need for the sewerage undertaker to have ownership of the land. Sometimes, however there will be an easement to give the sewerage undertaker greater powers of access.

For above ground components, the presence of the component can place significant restrictions on the use of the land. In addition the sewerage undertaker could require access to adjacent land to carry out our maintenance (e.g. to park plant or temporarily store sediment). These could be recognised in the form of an easement or in some cases, it could be more appropriate for the sewerage undertaker for the ownership of the land to be formally conveyed to them.

An example of a case where it is current practice to transfer the ownership of the land is at sewerage pumping stations. This is because the presence of the pumping station and the need to provide hardstanding and to provide for frequent access for maintenance vehicles will generally prevent the landowner from using the land.

For some components or parts of components the only restriction on use would be the occasional (infrequent) covering of the ground surface with water. This might be as infrequent as 1 in 5yrs, 1 in 30yrs or even 1 in 100yrs rainfall return periods on average. If the land has a recreational use, covering it in water for a short period at a frequency of even once or twice a year may not be considered to be restrictive and may not therefore indicate the need for a transfer.

For shared use land there are two options:

a) The sewerage undertaker to own land and leases it to other user with conditions that protect the function of the component and give rights of access;

b) The other user to own land with easement for the sewerage undertaker to ensure that the function of the component is protected.

Where shared use is proposed there must be an agreement about ownership or easements in place with the body that will manage the other use. This will need to be agreed before development commences.
1.3 Design

1.3.1 General

The detailed design should be in accordance with the CIRIA SuDS Manual (C753). It should also take account of the non-statutory standards produced by Defra or the Welsh Government and other relevant guidance.

The management plan which is part of the drainage strategy is fundamental to the design. This will set out the on-going maintenance requirements, which in turn will define the access required to undertake such maintenance.

The layout needs to take account of the position of foul sewer assets and the risk of pollution in the event of failure of the foul sewer system.

1.3.2 Health and Safety

The designer shall carry out a risk assessment in accordance with the RoSPA guidance in the CIRIA SuDS Manual and provide evidence that they have incorporated the findings into the design.

1.3.3 Reservoirs Act

Ponds and basins shall not be of a design that would be registrable as a 'large raised reservoir' under the Reservoirs Act 1975 (as amended). Presently, with only partial commencement of Schedule 4 of the Flood and Water Management Act 2010 (FWMA), the Reservoirs Act applies only to reservoirs over 25,000m$^3$ above the surrounding ground, though Defra are currently undertaking a review of the Reservoirs Act provisions. However FWMA prospectively applies to reservoirs over 10,000m$^3$ above the surrounding ground. The simplest way to achieve this this might be to make an upper size limit of 10,000 m$^3$ above the surrounding ground,

1.3.4 Access

To discharge their duties under the Construction (Design and Management) Regulations, the designer will need to prepare a management plan which lists the anticipated maintenance activities, their frequency and how they could be carried out safely.

Provision shall be made for the sewerage undertaker to access any component with appropriate plant and equipment to carry out the maintenance identified in the management plan.

Where access will be required for tankers, the parking area should be within a reasonable distance of the storage with safe unobstructed access for suction hoses. The access should be unrestricted and should provide for safe access and egress from the site as well as safe operation within the site. The size of tanker to be accommodated should be equal to the volume of the component up to a maximum of 18,000 litres.

The nature of any access will depend on the type of plant and machinery anticipated and the frequency of those activities. Where access is required for plant and machinery on a frequent basis an appropriate permanent access road is likely to be required. Where an area is also to be used for handling foul or combined sewage a paved road should be used. In other cases permeable paving or reinforced grass should be provided. Where it is anticipated that access will be required less frequently (e.g. less than once in 5 years) then temporary solutions such as provision for the use of portable access track systems could be acceptable.

Where de-sedimentation of open structures will be required, access should be provided for a suitable sized mechanical excavator. Consideration should also be given to the need for land for temporary storage of green or silt waste.
Infiltration trenches/filter drains should be designed with a perforated pipe along the whole length and adequate access chambers to provide access for inspection and maintenance.

1.3.5 Hydraulic design

Hydraulic design requirements include:

- Requirements to limit flooding within the site;
- Requirements to limit the impact of the drainage on any downstream sewers or other receiving waters.

The term flooding should be defined as a condition where water overflows onto a surface or enters a structure or area where it is not intended.

As a minimum the hydraulic design should comply with the criteria in SfA7 section C.5. The LPA can require higher design criteria.

Underground drainage systems (e.g. pipes and tanks) are designed to deal with a 1 in 30 year rainfall event. Design of piped systems with gully inlets to meet higher rainfall levels is not effective as the gullies will not allow more intense rainfall to enter the system. In these cases provision should be made for overland exceedance flood routes to manage these higher flows. Where other types of inlet are used (e.g. pervious pavements) these could allow higher flows to enter the system in which case the underground system may be designed to may therefore be designed to the 1 in 100 year rainfall plus climate change standard typically required by LLFA/LPAs. In these cases, however, the designer must demonstrate that the inlet arrangements will allow the design flows to enter the system

SuDS surface components (e.g. swales and ponds) can be designed to accept higher flow rates and may therefore be designed to the 1 in 100 year rainfall plus climate change standard typically required by LLFA/LPAs.

Therefore, provided there is provision for the flows to reach a particular component, surface components designed to take 1 in 100 year rainfall plus climate change are potentially adoptable.

Where surface components are fed by piped systems, the designer must demonstrate how the additional flows will reach the component via an overland flow route, either as a constructed component such as a swale or an informal route such as along a road.

Basins or swales that are designed to be filled with water intermittently should be designed so that the water is apparent at least a few times a year so that the public are aware of their function.

Restrictions on the flows discharged from the site are specified by the LPA. For small developments it is can be difficult to provide a flow control device that can sufficiently restrict the flows without an unacceptable risk of blockage. For this reason the LPA will sometimes permit higher flows from small developments.

The current guidance in SfA7 on minimum capacity of flow restriction devices will be reviewed to ensure that unnecessarily large flow rates are not accepted from small developments.
1.4 Construction

Construction should be in accordance with CIRIA Report C768 "Guidance on the construction of SUDS" CIRIA 2017. The developer shall ensure that the drainage is built to the approved design.

1.5 Provision of Information

In addition to customer leaflets, information boards should be provided where applicable to ensure that the public are aware of the function of visible sewerage assets, particularly any areas liable to be covered by water in wet weather.

\textsuperscript{1} Working title publication expected summer 2017
2 Non-SuDS aspects of SfA

2.1 Introduction

SfA8 will be based on SfA7 as that is the most up-to-date source document.

Topics covered by reference to the chapter headings in SfA7. The areas for consideration are listed below.

2.2 Part B – Foul Sewers and Lateral Drains

NOTE: Part B of SfA7 is currently identical to the Welsh Ministers Standards. Any change that would conflict with these standards would either have to be restricted to England or would have to be agreed by the Welsh Government.

2.2.1 Layout

The layout guidance in SfA7 assumed that FWMA Section 42 would be implemented in both England and Wales. Section 42 has however only been implemented for sewerage undertakers wholly or mainly in Wales. Sewerage undertakers wholly or mainly in England typically give developers a choice of using SfA6 or SfA7.

The key differences between SfA6,2.4 & 2.10 and SfA7 B3.1 are:

1) The location of adoptable sewers - SfA6, 2.4.1 is less explicit than SfA7, B.3.1.3. It is difficult to say that one is more or less restrictive than the other as they are slightly different in the restrictions they impose. In particular, SfA7 says that sewers should not be laid in enclosed back gardens. However, in practice this is often permitted provided access chambers in accessible locations offer maintenance access to the sewer. Figure B.3 shows such a layout though states it is not preferred.

2) SfA6 does not really cover the accessibility of manhole locations (other than a note in brackets in 2.4.1 to say that they should be accessible 24hrs a day). The wording in SfA7, B.3.1.2 tries to closely follow Building Regulations Approved Document H, H1.2.51, which says:

"Access points to sewers (serving more than one property) should be in places where they are accessible and apparent for use in an emergency. Examples of suitable locations include highways, public open space, unfenced front gardens and shared or unfenced driveways."

3) SfA7 includes layout plans that are premised on S42 being in force.

4) SfA7 has much simpler rules regarding the proximity of sewers to buildings and permits smaller shallow sewers to be much closer to buildings. SfA6 has a table of different requirements depending on company which might be difficult to sustain going forward.

Sewerage undertakers consider that adoption of all sewers and lateral drains connected to the sewer network is in the best interest of their customers (the occupiers of the properties). However, mandatory adoption has only been implemented for sewerage undertakers wholly or mainly in Wales. It is therefore proposed to retain the layout guidance in SfA7.

The standards in SfA7 will therefore only apply to those sewers and lateral drains offered for adoption effectively maintaining the choice for developers in England.
2.2.2 Access Chambers

SfA7 introduced the possibility of using inspection chambers and recommends their use more widely in locations where previously a manhole was recommended. It is understood that some companies are unwilling to accept inspection chambers in locations where they are recommended in SfA7.

SfA6 includes a two manhole types for very shallow applications (Type C and E - depth to soffit less than 1.5m and Type D - depth to soffit < 1.0m). These were not included as it was felt more appropriate to use inspection chambers as these manholes are often on small sewers in close proximity to buildings.

Due to the shallow depth the opening is enlarged to allow a person to stand in the manhole with their head and shoulders outside the chamber while still being able to work in the manhole.

The very large cover used on the Type C manhole is unsightly and is unpopular with some highway authorities due to road safety issues for motor cyclists and cyclists. In addition the CPSA raised concerns that the cover slab specified in Type E cannot be manufactured to current standards due to the large opening in relation to its diameter.

The existence of different manhole referencing systems in SfA6, Sewers for Scotland and Sewers for Adoption Northern Ireland are different to that used in SfA7. Users have suggested that a consistent referencing of manhole types would be less confusing.

2.2.3 Foul flow rates (B.5)

There has been some criticism of the foul flow rates. Concerns have been expressed that the numbers are based on out-dated high water usage rates and higher household sizes and could be substantially reduced. The rate quoted is however a peak flow rate rather than an average flow rate. Nevertheless, the empirical basis for the numbers is difficult to sustain without further research. The use of these figures for calculating additional flows for designing network reinforcement projects has also raised concerns and it should be clear that this method of calculation is not appropriate for design of network reinforcement projects.

As the number of properties connected that ratio of the peak flow rate to the average flow rate is known to reduce and SfA has never reflected this.

Practice in Sweden is to use the Discharge Unit method for specifying design flow rates. This is now recommended for use in the design of new sewer systems in a new European Standard (EN 16933-2:2017). This Discharge Unit method is based on the appliances installed and does allow for the reduction in the ratio of peak to average flow as the number of connected properties increases.

For a single dwelling this gives a slightly higher value than the current 4000 litres per dwelling per day, but reduces as the number of dwellings increases. The minimum pipe sizes determine the capacity of most foul sewers.

It is proposed that:

B.5.1 – Align with Sewers for Scotland (and Proposed European Standard) so that Flow is calculated in accordance with the Discharge Unit method as an alternative to 4000 l/dwelling per day.

Clarify that these figures should only be used for new systems not for calculating increased flows in existing systems. When determining need for reinforcement of an existing system the same method of calculation should be used for both the existing and proposed flows.

B.5.2 – Clarify what is meant by domestic flow from commercial buildings and the trade effluent flow as there is currently some confusion.
2.3 Part C – Surface Water Sewers and Lateral Drains

It is assumed that the existing requirements for piped surface water drainage will be incorporated into the new Surface Water Section that includes SuDS.

2.4 Part D – Pumping Stations

No significant changes are anticipated here. Some minor updates will be made due to changes to the standards referenced.

2.5 Part E – Civil Engineering Specification

No major changes are anticipated here. Some minor updates will be made due to changes to the standards referenced.

2.6 Part F – Mechanical and Electrical Specification

No major changes are anticipated here. Some minor updates will be made due to changes to the standards referenced.