CIRIA
2019 - A YEAR OF CHANGE FOR SUDS?

Sewers for Adoption 8th Edition
Design and Construction Guidelines
Bridging the Gap

Feb 2019
“One thing that really does worry me is we see all the pretty pictures of ponds / swales / wet lands etc but this is simply not what we are going to get in this dense urban environment with very high land values where developers are trying to squeeze more and more into ever tinier plots. Most of what they seem to be proposing is underground (attenuation tanks and the like) or permeable paving and I now see instance where they are wanting to discharge roof water within the permeable paving "storage" volume. The maintenance of these is going to be difficult but everybody still seems to be going on about big open "green" areas!“

Paul Ambrose (Bournemouth BC – 28th August 2014)

“The sustainable rainwater team in Portland OR told me the design of SuDS should be led by landscape architects and soil scientists. Engineers can advise how much water needs to be handled, plus make sure any structures are safe but they don’t have the skill-set to design SuDS. Obvious really; Luytens designed the house (maybe an engineer checked the structure), Jekyll designed the garden - not the other way round.

PS: it is not essential to have highly permeable soil with rapid infiltration to have successful SuDS. Portland has successful SuDS on soils that had very low infiltration; plants take up water and lateral flow of excess reduces the speed of runoff.”

Tim Evans (Proprietor at TIM EVANS ENVIRONMENT – 11th August 2014)
Sewers for Adoption are the guidance documents used by the water companies to approve and review drainage designs that are offered to them (or Vested) for adoption. This is usually via a Section 104 or similar agreement.

Currently both Editions 6 and 7 are used and accepted by the Water Companies.

In 2019 Sewers for Adoption 8 will replace both the previous versions and will be used for adoption agreements.
Contents

- Who is doing this and why?
- What’s going to be in it?
  - PART A – GENERAL
  - PART B – DESIGN AND CONSTRUCTION OF NEW FOUL SEWERS AND LATERAL DRAINS
  - PART C – DESIGN AND CONSTRUCTION OF NEW SURFACE WATER DRAINAGE SYSTEMS
  - PART D – PUMPING STATIONS
- Next Steps
And why?

Over the last few years there has been a grey area between SfA6 and SfA7 mainly due to supporting legislation not having been enacted (National Technical Standards).

The SfA8 revision is to clarify and update the position to have an agreed approach that is consistent. It will be more aligned to SfA7 but will also incorporate the following:

- Welsh Government implementation of Schedule 3 and Section 42 of FWMA
- Reviews into calculation of peak foul discharge from development
- To clarify and bridge the gaps in adoption related to SuDS in surface water management
- General update of standard details to reflect design code changes
- Clarify the Water Companies legal responsibilities – particularly for surface water
- Tie-in to the CIRIA SuDS Manual to seek common design standards
And why?

What sort of sustainable drainage system should be considered?

Generally, the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable:

- into the ground (infiltration);
- to a surface water body;
- to a surface water sewer, highway drain, or another drainage system;
- to a combined sewer.

Drainage Hierarchy – What is it?

NPPF

LEVEL 1: USE ON SITE
LEVEL 2: INFILTRATION
LEVEL 3: WATER BODY
LEVEL 4: SURFACE WATER SEWER
LEVEL 5: COMBINED WATER SEWER

NEVER: FOUL WATER SEWER
What’s going to be in it?

Part A – General

- Describes the scope of the “guidance” and lists definitions.
- Also describes the roles and responsibilities of various bodies relating to water (LLFA, LPA, Water Companies, EA, IDB etc)
- Provides a list of definitions (being reviewed and enhanced)
- Includes a section on developing drainage strategies (A4). This is to distinguish between the requirements for planning and the requirements for the adoption agreement.
- **IMPORTANTLY** this section describes the parts of a drainage network that **CANNOT** be adopted.....
What’s going to be in it?

Part A – General

SEWER

"sewer" includes all sewers and drains (not being drains within the meaning above) which are used for the drainage of buildings and yards appurtenant to buildings (see Water Industry Act 1991 s 219).

To be a sewer the channel must — “carry away” the foul sewage or surface water, and not simply collect or contain it. The requirement for the channel to — ”drain” is often referred to as a need for an — ”outfall”, a — ”proper outfall” or an — ”effective outfall”. An arrangement for conveying sewage which ends in a system which is entirely enclosed or lined with impermeable material will not have an effective outfall as the sewage will not drain; it will remain where it was collected. In addition, the consent of the landowner or relevant authority must be obtained to ensure that the outfall is lawful.
What’s going to be in it?

Part A – General

HIGHWAY DRAINAGE

In England (and in Wales until Schedule 3 of the Flood and Water Management Act 2010 is commenced (see A9.2), the water company is not obliged to accept runoff from newly-constructed streets into the public sewer system. The developer should note that acceptance of this runoff into the works and, ultimately, the public sewer system, is only by agreement, which will not be unreasonably withheld.

LAND DRAINAGE

In England (and in Wales until Schedule 3 of the Flood and Water Management Act 2010 is commenced, the connection of land drainage runoff, flows from watercourses or groundwater to the public sewer system, is not normally permitted.
What’s going to be in it?

Part B – DESIGN AND CONSTRUCTION OF NEW FOUL SEWERS AND LATERAL DRAINS LAYOUTS
What’s going to be in it?

Part C –
DESIGN AND CONSTRUCTION OF NEW SURFACE WATER DRAINAGE SYSTEMS

GENERAL

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 point of discharge, which must have lawful authority to discharge into a watercourse or other water body or onto or into land. As with conventional piped systems, this right to discharge must be secured by the developer and transferred to the water company on adoption.
What’s going to be in it?

Part C –
DESIGN AND CONSTRUCTION OF NEW SURFACE WATER DRAINAGE SYSTEMS

GENERAL

The following components are however excluded:

a) Watercourses as defined in law (these include rivers, streams and can include some ditches);

b) Components built for the drainage of surface water from roads or for the drainage of land;

c) Components built to manage groundwater;

d) 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);

e) 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).
What’s going to be in it?

Part C –
DESIGN AND CONSTRUCTION OF NEW SURFACE WATER DRAINAGE SYSTEMS

GENERAL

The government guidance to local authorities includes a hierarchy of connection, which can be summarised as follows:

a) surface water runoff is collected for use;
b) discharge into the ground via infiltration;
c) discharge to a watercourse or other surface water body;
d) discharge to a surface water sewer, highway drain or other drainage system, discharging to a watercourse or other surface water body;
e) discharge to a combined sewer.
What’s going to be in it?

Part C –
DESIGN AND CONSTRUCTION OF NEW SURFACE WATER DRAINAGE SYSTEMS

GENERAL

Where a developer proposes to connect surface water to the existing sewer system they should submit evidence to show how the surface water hierarchy has been applied to the site and why the connection to the sewer is the most practical solution. They should also show that this has been accepted by the LPA and in the cases of major developments, they should also show that this has been reviewed by the LLFA.
What’s going to be in it?

Part C –
DESIGN AND CONSTRUCTION OF NEW SURFACE WATER DRAINAGE SYSTEMS

GENERAL

Drainage Components on the Surface and Infiltration Systems

The capacity of surface level components (e.g., swales, ponds and basins) is not normally constrained by the capacity of the inlet system in the same way as underground components. They may, therefore, be designed to accept higher flow rates than underground drainage systems up to the 1 in 100 year rainfall event plus climate change standard typically required by local authorities.

Provided there is provision for the flows to reach a particular feature, surface SuDS features designed to take 1 in 100 year rainfall event plus climate change will normally be adoptable.
What’s going to be in it?

Part C –
DESIGN AND CONSTRUCTION OF NEW SURFACE WATER DRAINAGE SYSTEMS

HYDRAULIC DESIGN

Underground drainage components

Underground drainage pipes should be designed under pipe full conditions to accept the following design rainfall (i.e., without surcharging above pipe soffit):

- sites with average ground slopes greater than 1% 1 year;
- sites with average ground slopes 1% or less 2 year; and
- sites where consequences of flooding are severe 5 year.

(e.g., existing basement properties adjacent to new development)

The capacity of pipe should be increased further where it is necessary to comply with the flooding requirements (see C.5.4.1).
What’s going to be in it?

Part C –
DESIGN AND CONSTRUCTION OF NEW SURFACE WATER DRAINAGE SYSTEMS
DETAILED DESIGN OF COMPONENTS

Infiltration components

Where components involve infiltration of surface water into the ground, the infiltration potential of the soil and subsoil should be confirmed by geo-technical tests taking account of the variation of groundwater conditions throughout the year. The highest groundwater level should be at least 1m below the base of the proposed infiltration component. A completed copy of the infiltration potential checklist (CIRIA SuDS Manual Table B.6) should be submitted with the S104 Application.
What’s going to be in it?

Part C –
DESIGN AND CONSTRUCTION OF NEW SURFACE WATER DRAINAGE SYSTEMS
DETAILED DESIGN OF COMPONENTS

Flow control devices

- Where debris can enter the control (e.g. where the upstream system is open or where the inlets are gullies), static controls should have a minimum opening size of 100 mm, or equivalent.

- where the design of the upstream system will prevent debris entering the system (e.g. underground systems where the inlets are pervious pavement systems), static controls should have a minimum opening size of 50 mm.
What’s going to be in it?

Part C –
DESIGN AND CONSTRUCTION OF NEW SURFACE WATER DRAINAGE SYSTEMS

HYDRAULIC DESIGN

Drainage components on the surface

Surface water sewer systems should be designed to take the runoff from roofs, yards belonging to those buildings, and, subject to the agreement of the water company, may also take runoff from highways (including verges) (see A9). For these areas, an impermeability of 100% should be assumed unless it can be demonstrated that the proposed management arrangements will limit the rate of runoff to a lower level. An impermeability of 100% should be used in all cases when determining exceedance flows. Provided there is provision for the flows to reach a particular feature, surface SuDS features designed to take 1 in 100 year rainfall plus climate change will normally be adoptable.
What’s going to be in it?

Part C –
DESIGN AND CONSTRUCTION OF NEW SURFACE WATER DRAINAGE SYSTEMS

HYDRAULIC DESIGN

Underground drainage components

The capacity of inlets to the systems (e.g. gullies or pervious paving systems) can limit the capacity of underground drainage systems. Gully systems designed in accordance with the Design Manual for Roads and Bridges (HA 102/00) will not admit all the flows from highways into an underground system during extreme events. Where the design of the system requires that flows from rainfall events in excess of the capacity of the gully systems are conveyed or stored in an underground system, the designer should use alternative inlets systems with higher capacity.
What’s going to be in it?

Part C – DESIGN AND CONSTRUCTION OF NEW SURFACE WATER DRAINAGE SYSTEMS

What SuDS are adoptable?
What’s going to be in it?

Part C –
DESIGN AND CONSTRUCTION OF NEW SURFACE WATER DRAINAGE SYSTEMS

What SuDS are adoptable?

<table>
<thead>
<tr>
<th>Component Type</th>
<th>Adoptable under SfA8</th>
<th>Managed by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rainwater Harvesting Systems</td>
<td>NO</td>
<td>Private</td>
</tr>
<tr>
<td>Green Roofs</td>
<td>NO</td>
<td>Private</td>
</tr>
<tr>
<td>Infiltration Systems</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Proprietary Treatment Systems</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Filter Strips</td>
<td>NO</td>
<td>Private / Highways</td>
</tr>
<tr>
<td>Filter Drains</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Swales / Rills</td>
<td>YES</td>
<td>Unless Highways</td>
</tr>
<tr>
<td>Bioretention Systems</td>
<td>YES</td>
<td>Unless Highways</td>
</tr>
</tbody>
</table>
### What’s going to be in it?

**Part C – DESIGN AND CONSTRUCTION OF NEW SURFACE WATER DRAINAGE SYSTEMS**

**What SuDS are adoptable?**

<table>
<thead>
<tr>
<th>Component Type (continued)</th>
<th>Adoptable under SfA8</th>
<th>Managed by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trees (as defined in the SuDS Manual)</td>
<td>NO</td>
<td>Private / Highways</td>
</tr>
<tr>
<td>Pervious Pavements</td>
<td>NO</td>
<td>Private / Highways</td>
</tr>
<tr>
<td>Attenuation Storage Tanks</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Detention Basins</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Ponds</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Wetlands</td>
<td>YES</td>
<td></td>
</tr>
</tbody>
</table>
What it might look like

Part C – DESIGN AND CONSTRUCTION OF NEW SURFACE WATER DRAINAGE SYSTEMS

What SuDS are adoptable?

- Attenuation Storage (Tanks)
- Swale
- Permeable Paving
- Bio-retention
- Green Roof
- Attenuation Storage (Basin / Pond)
What it might look like

Part C –
DESIGN AND CONSTRUCTION OF NEW SURFACE WATER DRAINAGE SYSTEMS

What SuDS are adoptable? – Existing SfA6/7

Proposed Development
What it might look like

Part C –
DESIGN AND CONSTRUCTION OF NEW SURFACE WATER DRAINAGE SYSTEMS

What SuDS are adoptable? – Existing SfA6/7

Proposed Development -
Highway Drainage
What it might look like

Part C –
DESIGN AND CONSTRUCTION OF NEW SURFACE WATER DRAINAGE SYSTEMS

What SuDS are adoptable? – Existing SfA6/7

- RESIDENTIAL
- TANK
- BASIN/POND
- SWALE
- BASIN/POND
- TANK
- HIGHWAY
What it might look like

Part C –
DESIGN AND CONSTRUCTION OF NEW SURFACE WATER DRAINAGE SYSTEMS

What SuDS are adoptable? – SfA8

- Fewer pipe runs
- More certainty on Adoption
- Better SuDS solution
What it might look like

- Adoption Guidance from the individual Water Companies
What it might look like

- Adoption Guidance from the individual Water Companies

Part A – SuDS Design Standards

Icosa Water will take a holistic approach to water management on new developments and will seek to create a network that manages water by either returning it to the natural environment in a clean and healthy state or using the water for other purposes. Usually we strive for a combination of both and to that end we will consider adopting the following SuDS features and their associated inlets and outlets:

- Ponds
- Detention and Infiltration Basins
- Wetlands
- Swales
- Filter Strips
- Oversized Pipes
- Storage Chambers

The following pages will give design guidance to assist developers in making a submission that is acceptable to Icosa Water.
What it might look like

SuDS ponds should be constructed to look like natural ponds but should include the following features:

- 1.2m wide dry bench around the pond and above the level of peak flows. This bench should always be level and grassed where appropriate.
- A 150mm timber knee rail should be placed at the back of the 1.2m wide dry bench.
- A minimum of 2 warning signs (Danger Deep Water – Keep Out) should be displayed at all ponds just inside the timber knee rail. Further signs will be required every 250m² where a pond exceeds 500m² when in flood.
- Slopes to the pond should not exceed a gradient of 1 in 3.
- 1.2m wide wet bench around the permanent water level. This bench should always be level.
- The inlet structure should have a catchpit immediately upstream and should have suitable access for a tanker to be able to empty it. The access should also serve as a maintenance point for vehicles working around the pond.
- The inlet structure should incorporate some element of erosion control where necessary and also a planted forebay or planted shelf to improve water quality.
- Inlets and outlets should be positioned such that retention time for the water is maximised and to ensure that water cannot ‘short circuit’ the pond in times of high flow.
- The pond should have a minimum freeboard of 300mm
- The storage volume above the permanent water level should not exceed 600mm.
What it might look like

- Adoption Guidance from the individual Water Companies

Need to beware of standardisation and simplification of Adopted SuDS to avoid them becoming bland and uninspiring and ultimately not achieving their full potential.
What’s going to be in it?

Symbology – ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

- Flooded: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.
- Surface Water: A sewer designed to convey surface water (e.g. rainwater from roofs, yards and car parks) to rivers or watercourses.
- Combined: A sewer designed to convey both wastewater and surface water from domestic and industrial sources to a treatment works.

Sewer Fittings

- Air Valve
- DEM Valve
- Fitting
- Manhole
- Vent Column

Operational Controls

- Control Valve
- Deep/Prime
- Ancillary
- WVR

End Items

- Outlet
- Undershaft End
- Inlet

Notes:

1) Mileage associated with the plans are to Ordnance Datum Newlyn.
2) Mileage measurements for the plans are metric.
3) Arrows (in grey) link sewerage or trunk (in red) indicate direction of flow.
4) Distances (in grey) are not shown on plans, as in the past, this information has not been recorded.
5) Ref ‘s’ or ‘r’ s are metric mile references that data is unavailable.

Example: Current.
Reference Material:

1 - Pre-implementation SfA8
https://www.water.org.uk/policy/improving-resilience/sustainable-drainage-systems

2 - The SuDS Manual (CIRIA C753)
https://www.susdrain.org/resources/ciria-guidance.html#cgsuds

3 - “The Environment” October 2018 (CIWEM)
Thank you!