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.*

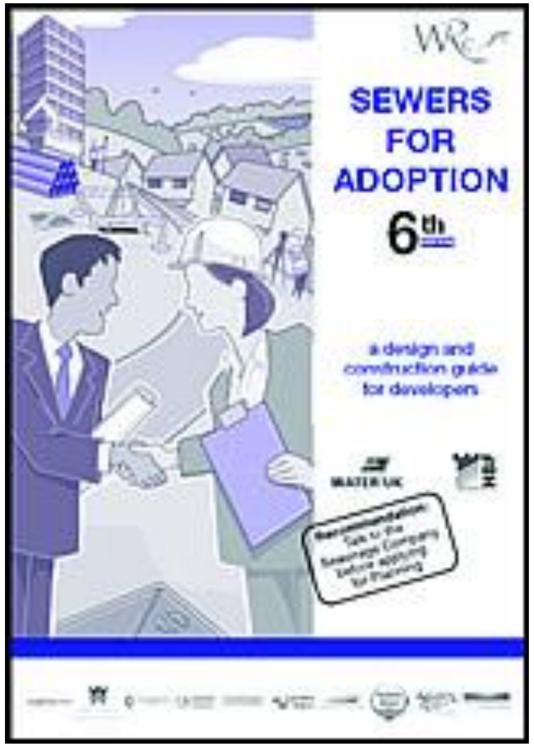
PS: it is not essential to have highly permeable soil with rapid infiltration to have successful SuDS. Portland has successful SuDS on soils that had very low infiltration; plants take up water and lateral flow of excess reduces the speed of runoff."

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.



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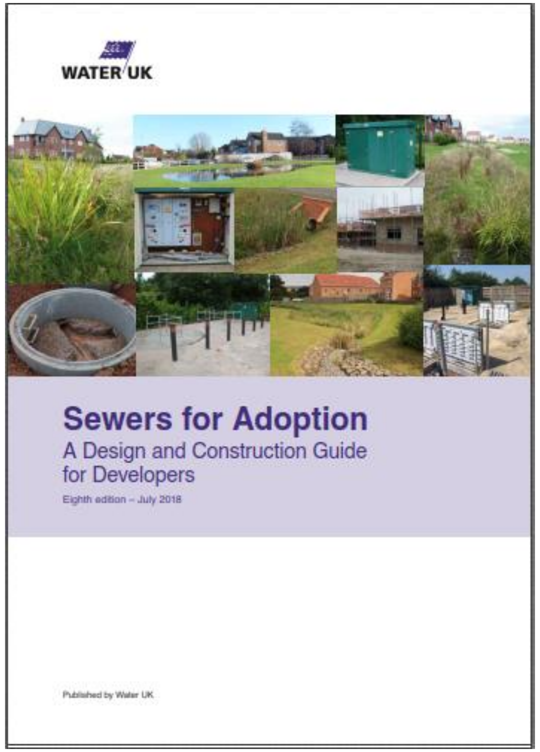

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- Who is doing this and why?

- 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.

— https://www.gov.uk/guidance/flood-risk-and-coastal-change

Drainage Hierarchy – What is it?

NPPF

PLANNING PRESSURE

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

ADOPTION PRESSURE

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***.

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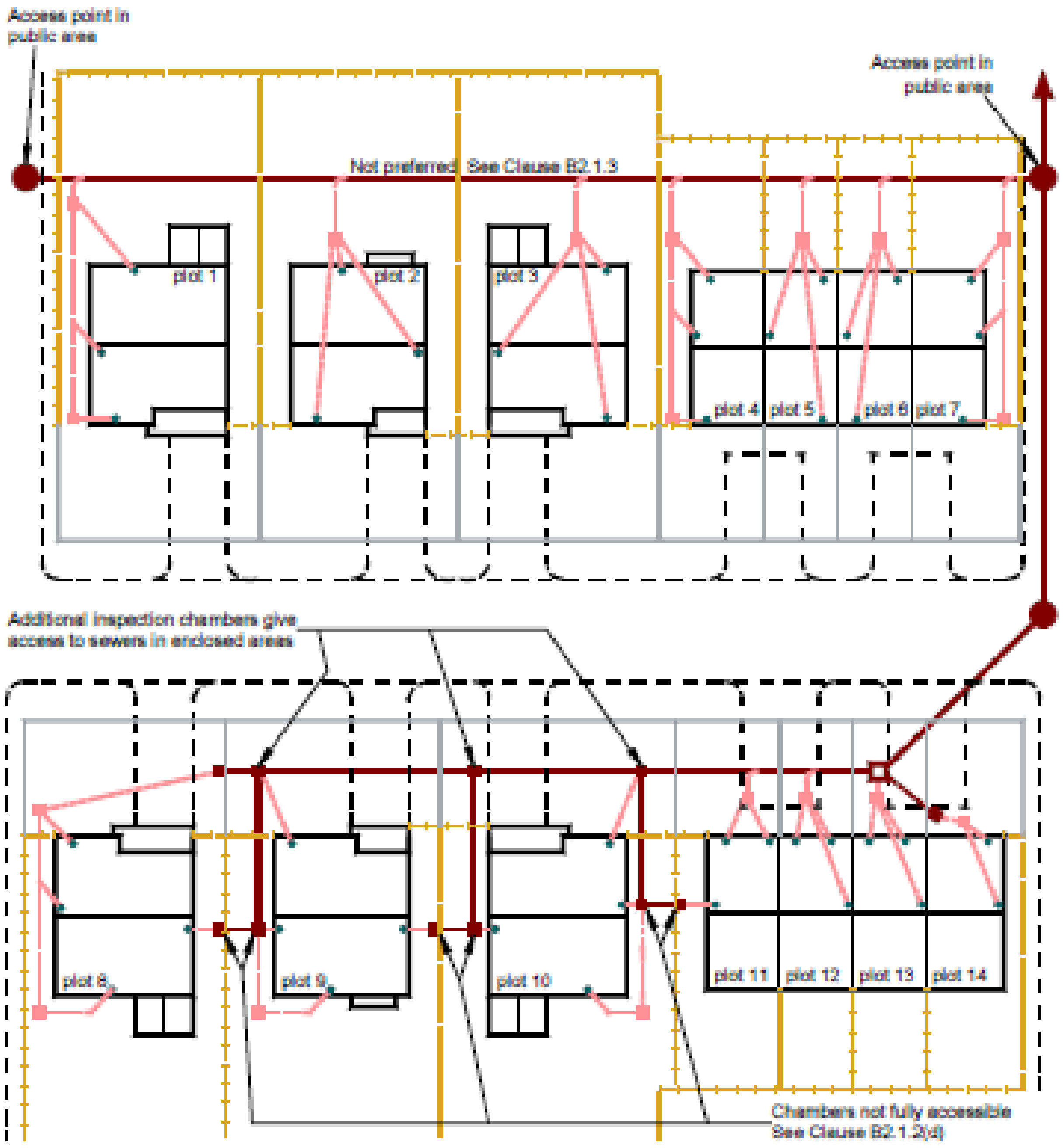
What’s going to be in it?

Part B –
DESIGN AND CONSTRUCTION OF NEW FOUL SEWERS AND LATERAL DRAINS

LAYOUTS



Key:
Sewers serving more than 10 dwellings to be minimum 150 mm diameter.
Other sewers or lateral drains to be minimum 100 mm diameter

- Foul sewer
- Foul lateral drain
- Foul drain (not adoptable)
- Foul manhole
- Type 3 foul inspection chamber
- Type 4 foul inspection chambers - not greater than 3 properties
- Type 4 foul inspection chambers - not greater than 1 property (not adoptable)
- Unfenced or low fence boundary
- High fence boundary

Note: Some inspection chambers act as demarcation chambers.

wsp

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.

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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?

TABLE 7.1 SuDS component delivery of design criteria

Component type	Description	Collection mechanism	Design criteria: Water quantity (Chapter 3): Peak runoff rate	Design criteria: Water quantity (Chapter 3): Runoff volumes: Small events (Interception)	Design criteria: Water quantity (Chapter 3): Runoff volumes: Large events	Design criteria: Water quality (Chapter 4)	Design criteria: Amenity (Chapter 5)	Design criteria: Biodiversity (Chapter 6)	Further information (Chapter ref)
Rainwater harvesting systems	Systems that collect runoff from the roof of a building or other paved surface for use	P		●	●		●		11
Green roofs	Planted soil layers on the roof of buildings that slow and store runoff	S	○	●		●	●	●	12
Infiltration systems	Systems that collect and store runoff, allowing it to infiltrate into the ground	P	●	●	●	●	●	●	13
Proprietary treatment systems	Subsurface structures designed to provide treatment of runoff	P				●			14
Filter strips	Grass strips that promote sedimentation and filtration as runoff is conveyed over the surface	L		●		●	○	○	15
Filter drains	Shallow stone-filled trenches that provide attenuation, conveyance and treatment of runoff	L	●	○		●	○	○	16
Swales	Vegetated channels (sometimes planted) used to convey and treat runoff	L	●	●	●	●	●	●	17
Bioretention systems	Shallow landscaped depressions that allow runoff to pond temporarily on the surface, before filtering through vegetation and underlying soils	P	●	●	●	●	●	●	18
Trees	Trees within soil-filled tree pits, tree planters or structural soils used to collect, store and treat runoff	P	●	●		●	●	●	19
Pervious pavements	Structural paving through which runoff can soak and subsequently be stored in the sub-base beneath, and/or allowed to infiltrate into the ground below	S	●	●	●	●	○	○	20
Attenuation storage tanks	Large, below-ground voided spaces used to temporarily store runoff before infiltration, controlled release or use	P	●						21
Detention basins	Vegetated depressions that store and treat runoff	P	●	●		●	●	●	22
Ponds and wetlands	Permanent pools of water used to facilitate treatment of runoff – runoff can also be stored in an attenuation zone above the pool	P	●			●	●	●	23

Key

P – Point, L – Lateral, S – Surface, ● – Likely valuable contribution to delivery of design criterion, ○ – Some potential contribution to delivery of design criterion, if specifically included in the design

What's going to be in it?

Part C –

DESIGN AND CONSTRUCTION OF NEW SURFACE WATER DRAINAGE SYSTEMS

What SuDS are adoptable?

Component Type	Adoptable under SfA8	Managed by
Rainwater Harvesting Systems	NO	Private
Green Roofs	NO	Private
Infiltration Systems	YES	
Proprietary Treatment Systems	YES	
Filter Strips	NO	Private / Highways
Filter Drains	YES	
Swales / Rills	YES	Unless Highways
Bioretention Systems	YES	Unless Highways

What's going to be in it?

Part C –

DESIGN AND CONSTRUCTION OF NEW SURFACE WATER DRAINAGE SYSTEMS

What SuDS are adoptable?

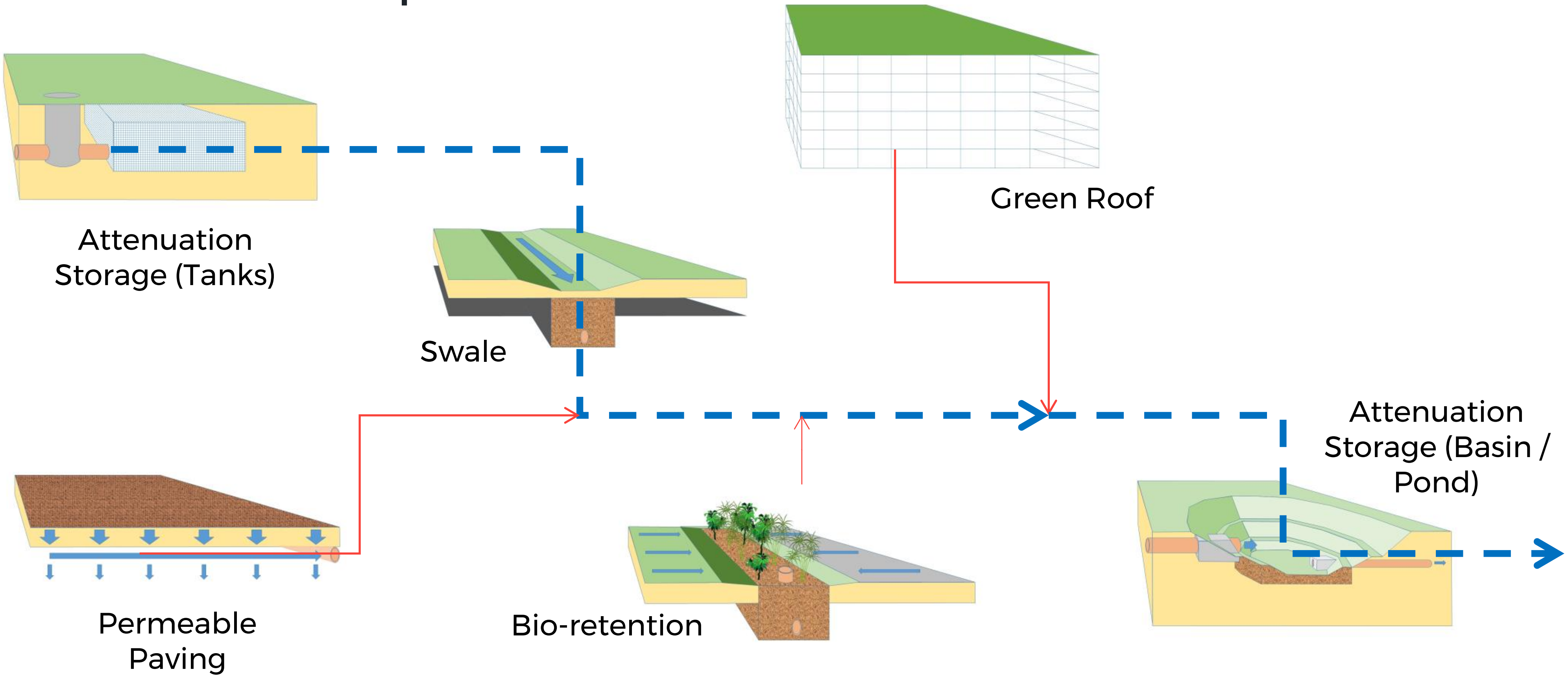
Component Type (continued)	Adoptable under SfA8	Managed by
Trees (as defined in the SuDS Manual)	NO	Private / Highways
Pervious Pavements	NO	Private / Highways
Attenuation Storage Tanks	YES	
Detention Basins	YES	
Ponds	YES	
Wetlands	YES	

What it might look like

Part C –

DESIGN AND CONSTRUCTION OF NEW SURFACE WATER DRAINAGE SYSTEMS

What SuDS are adoptable?

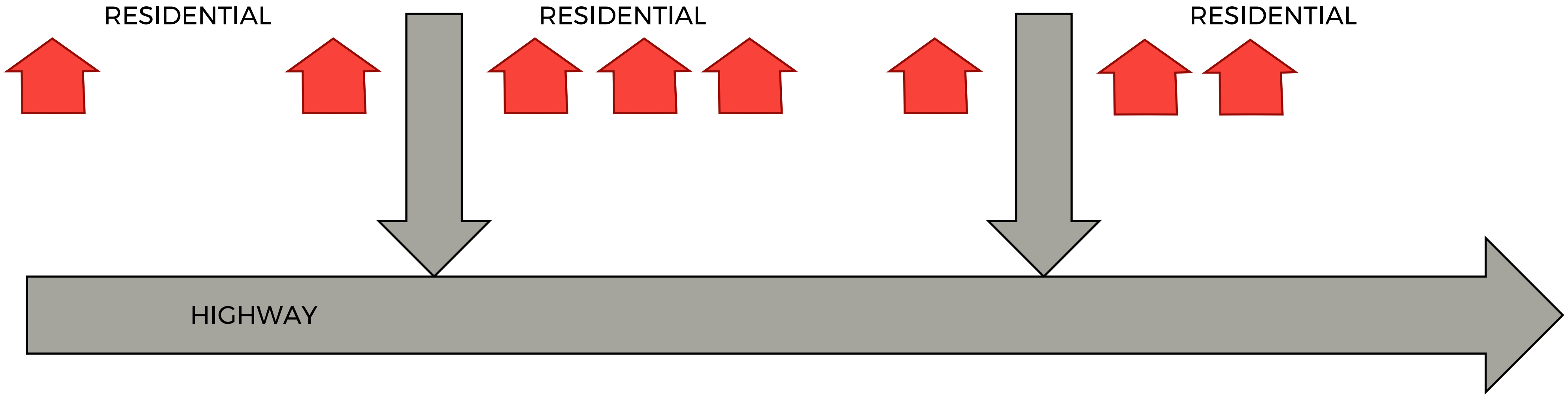


What it might look like

Part C –

DESIGN AND CONSTRUCTION OF NEW SURFACE WATER DRAINAGE SYSTEMS

What SuDS are adoptable? – Existing SfA6/7



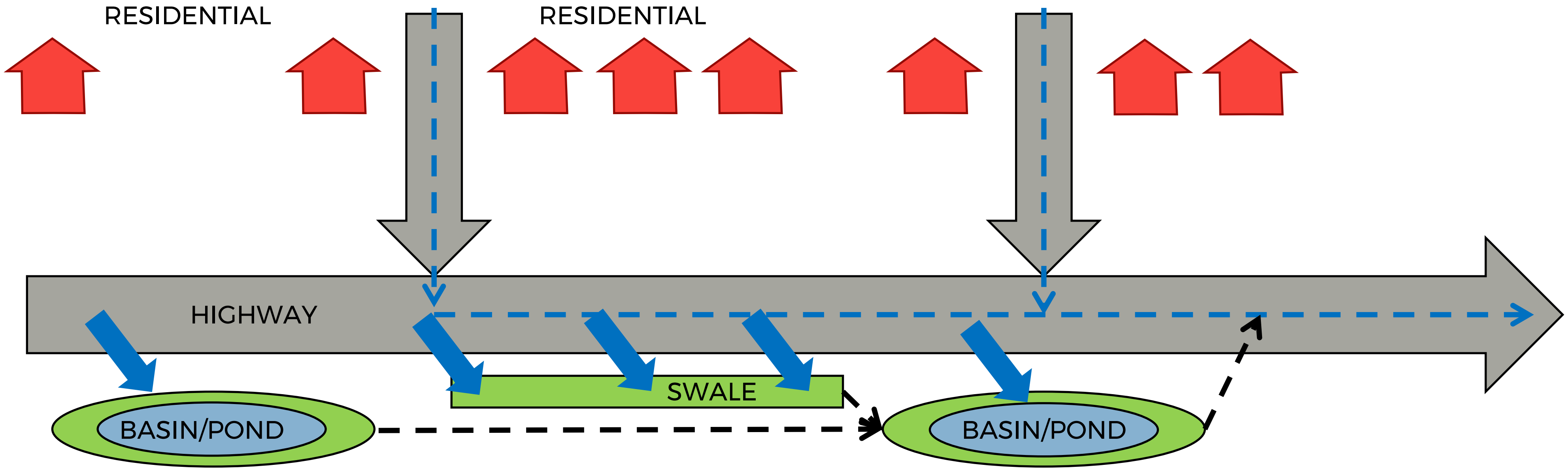
Proposed Development

What it might look like

Part C –

DESIGN AND CONSTRUCTION OF NEW SURFACE WATER DRAINAGE SYSTEMS

What SuDS are adoptable? – Existing SfA6/7



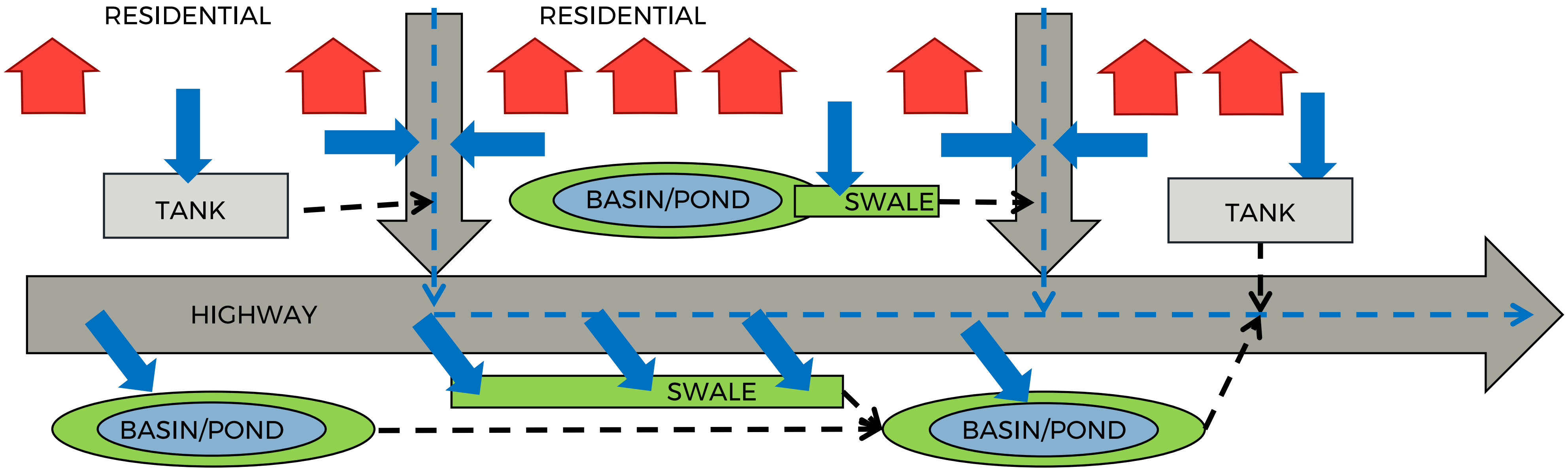
Proposed Development - Highway Drainage

What it might look like

Part C –

DESIGN AND CONSTRUCTION OF NEW SURFACE WATER DRAINAGE SYSTEMS

What SuDS are adoptable? – Existing SfA6/7

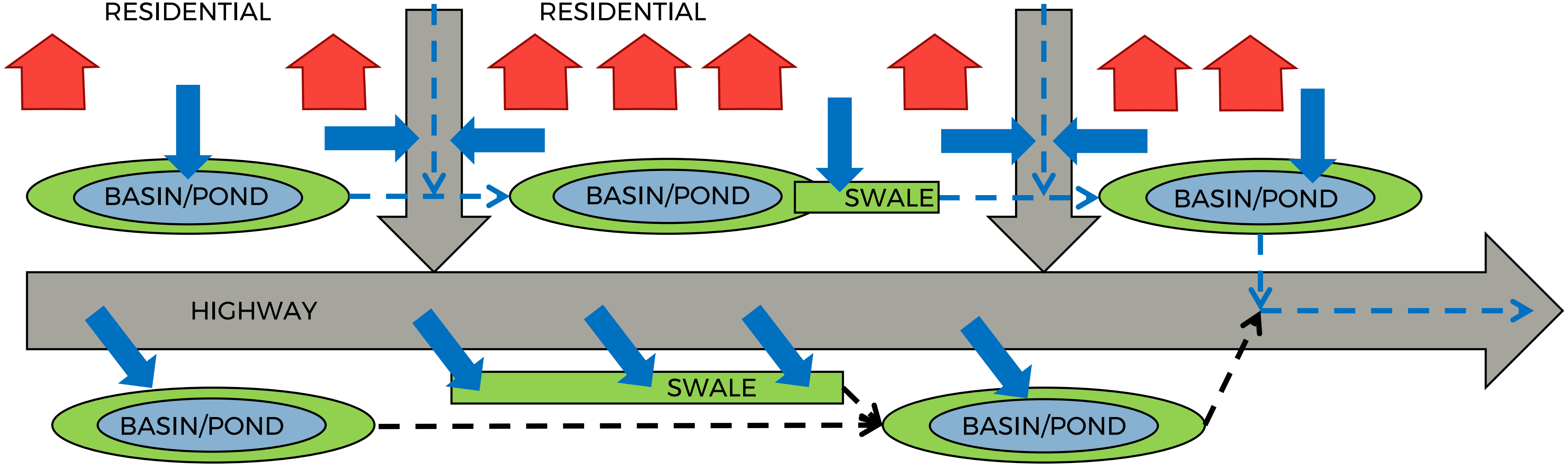


What it might look like

Part C –

DESIGN AND CONSTRUCTION OF NEW SURFACE WATER DRAINAGE SYSTEMS

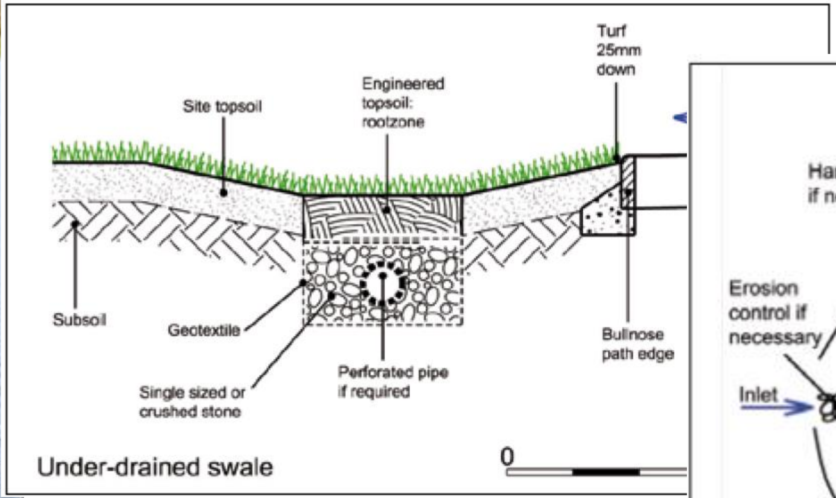
What SuDS are adoptable? – SfA8



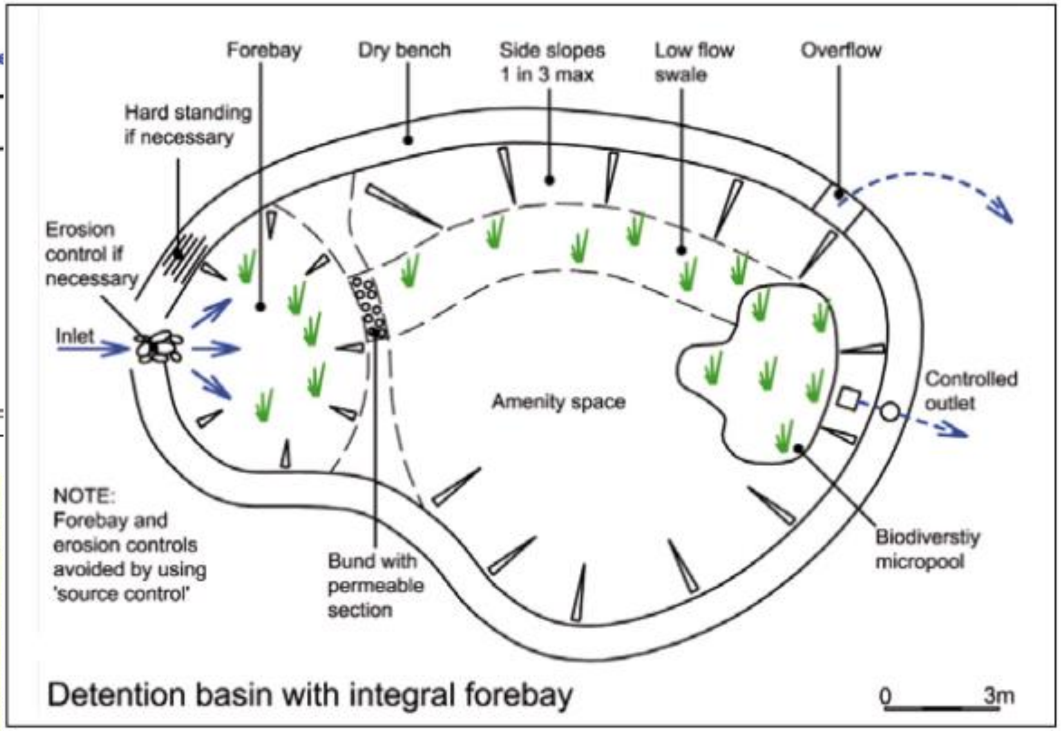
- Fewer pipe runs
- More certainty on Adoption
- Better SuDS solution

What it might look like

- Adoption Guidance from the individual Water Companies

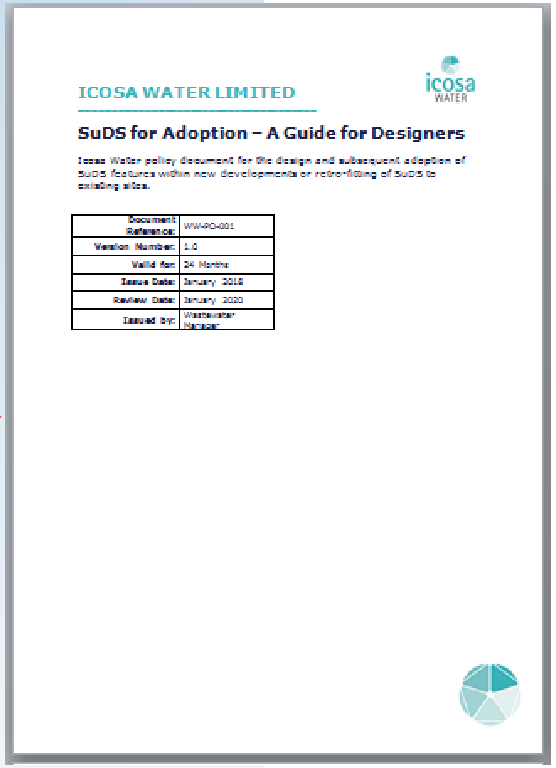


Mitred concrete headwall



What it might look like

- **Adoption Guidance from the individual Water Companies**


ICOSA WATER LIMITED

SuDS for Adoption – A Guide for Designers

Icosa Water policy document for the design and subsequent adoption of SuDS features within new developments or retro-fitting of SuDS to existing sites.

Document Reference:	WW-PO-001
Version Number:	1.0
Valid for:	24 Months
Issue Date:	January 2018
Review Date:	January 2020
Issued by:	Wastewater Manager

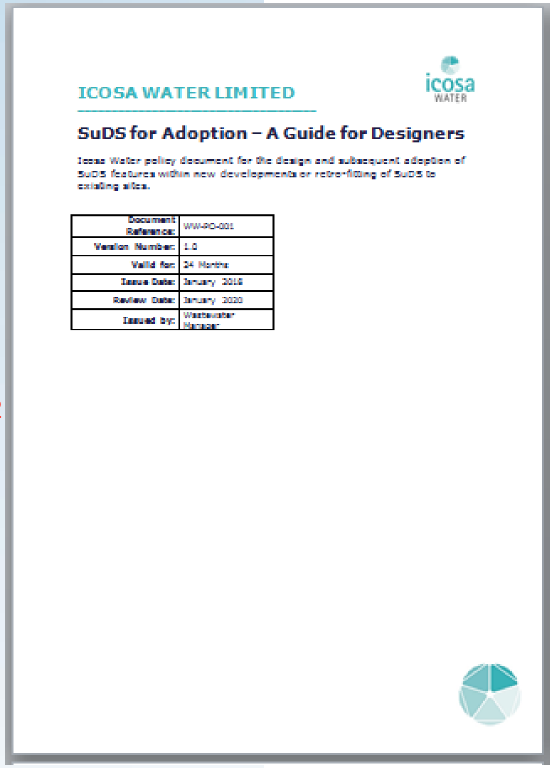
Part A – SuDS Design Standards

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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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**

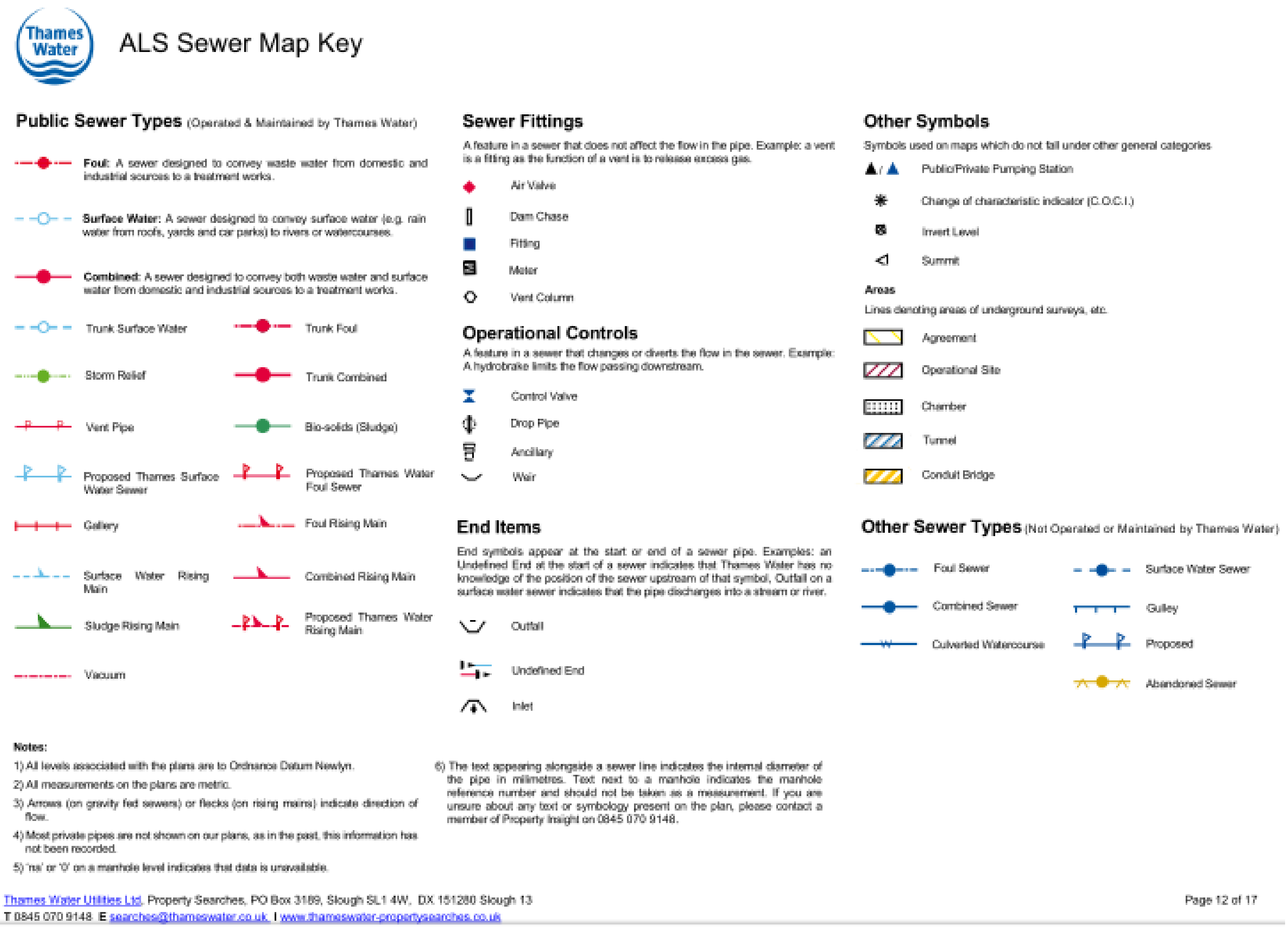
Need to beware of standardisation and simplification of Adopted SuDS to avoid them becoming bland and uninspiring and ultimately not achieving their full potential.

What's going to be in it?

Symbology –

Example:

Current.



Thames Water

ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

Foul: 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. rain water from roofs, yards and car parks) to rivers or watercourses.

Combined: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.

Trunk Surface Water

Trunk Foul

Storm Relief

Trunk Combined

Vent Pipe

Bio-solids (Sludge)

Proposed Thames Surface Water Sewer

Proposed Thames Water Foul Sewer

Gallery

Foul Rising Main

Surface Water Rising Main

Combined Rising Main

Sludge Rising Main

Proposed Thames Water Rising Main

Vacuum

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

Air Valve

Dam Chase

Fitting

Meter

Vent Column

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

Control Valve

Drop Pipe

Ancillary

Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol, Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

Outfall

Undefined End

Inlet

Other Symbols

Symbols used on maps which do not fall under other general categories

Public/Private Pumping Station

Change of characteristic indicator (C.O.C.I.)

Invert Level

Summit

Areas

Lines denoting areas of underground surveys, etc.

Agreement

Operational Site

Chamber

Tunnel

Conduit Bridge

Other Sewer Types (Not Operated or Maintained by Thames Water)

Foul Sewer

Surface Water Sewer

Combined Sewer

Gulley

Culverted Watercourse

Proposed

Abandoned Sewer

Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.
2) All measurements on the plans are metric.
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.
4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
5) 'na' or '0' on a manhole level indicates that data is unavailable.
6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimetres. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology present on the plan, please contact a member of Property Insight on 0845 070 9148.

Thames Water Utilities Ltd, Property Searches, PO Box 3189, Slough SL1 4W, DX 151280 Slough 13
T 0845 070 9148 E searches@thameswater.co.uk I www.thameswater-propertysearches.co.uk

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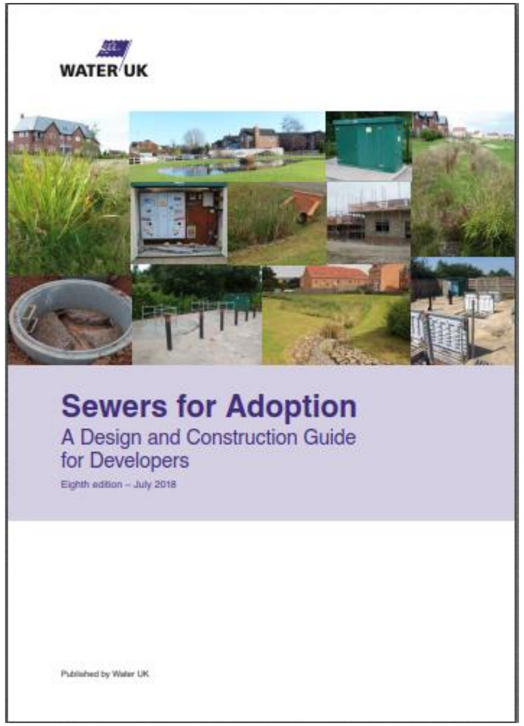
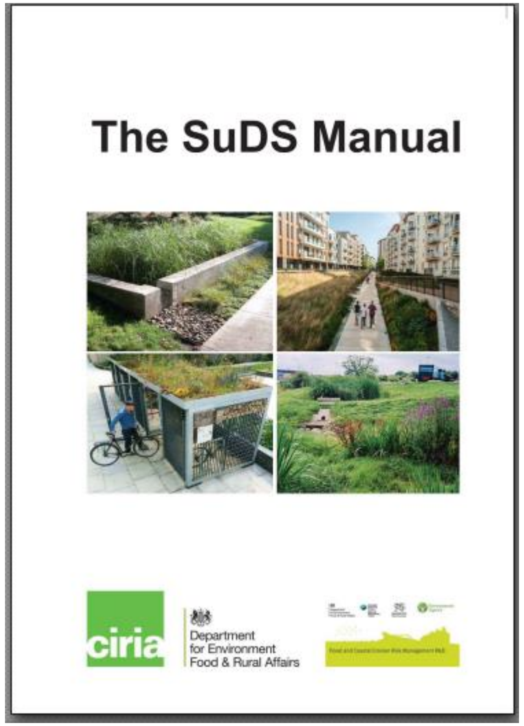
Reference Material:

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!

wsp.com