A Guide to SuDS and Drainage in Solihull

DEVELOPERS' GUIDE TO SUSTAINABLE DRAINAGE

Solihull Metropolitan Borough Council

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1. INTRODUCTION

Since April 2015 the Drainage and Flood Risk team in Solihull Council have been a statutory consultee on all major planning applications as part of their role as Lead Local Flood Authority.

What is the aim of this guide?

This document aims to provide guidance on the requirements of planning, design and implementation of SuDS in accordance with national and local policy and guidance.

It notes local policy requirements and provides specific engineering details where the requirements in Solihull differ from national standards.

Who is this guide for?

This guide is to be used by all involved in the planning, design, construction, implementation, operation, maintenance and decommissioning of SuDS in Solihull.

This includes, but is not limited to: developers, designers, consultants, planners, property & land owners and occupiers, prospective adopters & maintainers and others involved in the planning and design of the built environment in Solihull.

This guidance should be used for all types of development, including residential, commercial, industrial and recreational.

2. Policy Guidance

This section lists the key local policies relating to drainage in Solihull. For further detail see the documents on the SMBC website.

Strategic Flood Risk Assessment (2008)

All sites require the following: - SuDS, Greenfield discharge rates with a minimum reduction of 20%, as required by the Environment Agency, 1 in 100 year on-site attenuation taking into account climate change Space should be specifically set aside for SUDS and used to inform the overall site layout.

An assessment of the condition of existing assets (e.g. bridges, culverts, river walls) should be made. Refurbishment and/or renewal of the asset should ensure that the design life is commensurate with the design life of the development. Developer contributions should be sought for this purpose

Those proposing development should look for opportunities to undertake river restoration and enhancement as part of a development to make space for water. Enhancement opportunities should be sought when renewing assets (e.g. de-culverting, the use of bio-engineered river walls, raising bridge soffits to take into account climate change)

Avoid further culverting and building over of culverts. Where practical, all new developments with culverts running through their site should seek to de-culvert rivers for flood risk management and conservation benefit

It is therefore imperative that developers hold discussions over the need for FRAs early on within the planning process.

In line with PPS25, development will not normally be allowed in the Functional Floodplain unless it is classified as a 'water compatible' or 'essential infrastructure' use.

Solihull Local Plan (2013)

POLICY P10 Natural Environment

…The Council will seek to conserve, enhance and restore biodiversity and geodiversity, to create new native woodlands and other habitats and to protect, restore and enhance ancient woodland and green infrastructure assets across the Borough. Protection of ancient woodland, designated sites and priority habitats shall include the establishment of buffers to any new development. Development should be informed by the latest information on habitats and species, and take full account of national and local guidance on conserving biodiversity, opportunities for biodiversity enhancement and for improving and restoring the Borough's green infrastructure. When appropriate, development should seek to enhance accessibility to the natural environment, especially for disabled people…

Solihull Local Plan (2013) *Continued*

POLICY P11 WATER MANAGEMENT

All new development should have regard to the actions and objectives of appropriate River Basin Management Plans in striving to protect and improve the quality of water bodies in and adjacent to the Borough, including the Rivers Blythe and Cole and their tributaries. Developers shall undertake thorough risk assessments of the impact of proposals on surface and groundwater systems and incorporate appropriate mitigation measures where necessary. The Council will expect developers to demonstrate that all proposed development will be served by appropriate sewerage infrastructure and that there is sufficient sewage treatment capacity to ensure that there is no deterioration of water quality, or that the delivery of any development will not be delayed by the need for additional water treatment provision.

The Council recognises the need for water efficiency in all new development. Developers shall demonstrate the highest possible standards of water efficiency through the use of water efficient fittings and appliances, and where appropriate, recycling of potable, grey water and rainwater in order to minimise consumption.

All new development shall incorporate sustainable drainage systems, unless it is shown to be impractical to do so. Developers shall ensure that adequate space is made for water within the design layout of all new developments to support the full use of sustainable drainage systems, and shall demonstrate that improvements to the water environment will be maximised through consideration of a range of techniques. Wherever possible, sustainable drainage systems will be expected to contribute towards wider sustainability considerations, including amenity, recreation, conservation of biodiversity and landscape character, as well as flood alleviation and water quality control.

Developers shall explore opportunities to contribute towards the objectives of relevant Catchment Flood Management Plans. Wherever possible, development should promote the reduction of flood risk by seeking to reinstate the natural floodplain, the de-culverting of watercourses and the limiting of surface water runoff to green field rates via the use of sustainable drainage techniques. On all development sites larger than 1 hectare, surface water discharge rates shall be limited to the equivalent site specific Greenfield run off rate. Developers will be expected to demonstrate that the layout and design of a development takes account of the surface water flows in extreme events so as to avoid flooding of properties, both within and outside the site. Applications for new development where there is a flood risk issue should be accompanied by a site flood risk assessment. Developers are encouraged to secure reduction of flood risk by the provision or enhancement of green infrastructure, wherever possible.

Existing flood defence infrastructure will be protected and development that would compromise the flood defence function will be permitted only if it is demonstrated through a flood risk assessment that the risk both within and outside the site, and to sites further downstream is not increased.

New development will not normally be permitted within areas at risk of flooding. Where it is clearly demonstrated that there are no other viable sites at lower risk of flooding, consideration will be given to development in such locations, providing that it is designed to be safe from the effects of flooding and will minimise flood risk on the site and reduce risks elsewhere.

Solihull Local Plan (2013) Continued

POLICY P15 SECURING DESIGN QUALITY
All development proposals will be expected to achieve good quality, inclusive and sustainable design, which meets the following key principles:

…

iv. Makes appropriate space for water within the development, using sustainable drainage (SuDS) principles, to minimise and adapt to the risk of flooding. Further guidance is provided in Policy P11 – Water Management;

…

Local Flood Risk Management Strategy (2015)

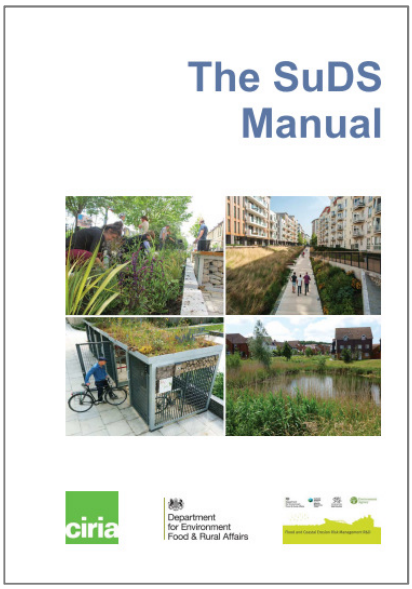
Ensure that new development is not at risk of flooding and does not create or exacerbate existing flooding or drainage issues.

Sustainability – schemes should take account of predicted climate change, and enhance the natural environment where possible.

If a site-specific flood risk assessment is necessary, it must demonstrate that the development will not increase flood risk at the site or elsewhere, and be safe for the development lifetime.

3. Design Guidance

All drainage features should conform to the latest editions of the CIRIA SuDS Manual or Sewers for Adoption. This section provides specific clarifications and modifications of the advice found in those documents.



Swales and Highway Drainage

Swales should be the first choice for receiving highway water and conveying all surface water through a site. We prefer gully free highways that run off directly to swales or through kerb drainage. Connecting traditional highway gullies to swales is not encouraged. Swale side slopes must be no steeper than 1:4 to allow for maintenance contractors' requirements.

Ditches

Existing ditch networks on a greenfield site must be preserved and enhanced. A ditch network should form part of the drainage system for the site if it has appropriate capacity.

Permeable Paving

Permeable paving is encouraged as surfacing to parking areas and in the highway on minor roads. The construction can use either permeable sub-base or cellular storage to provide adequate storage volumes as long as the product used is strong enough for the proposed location.

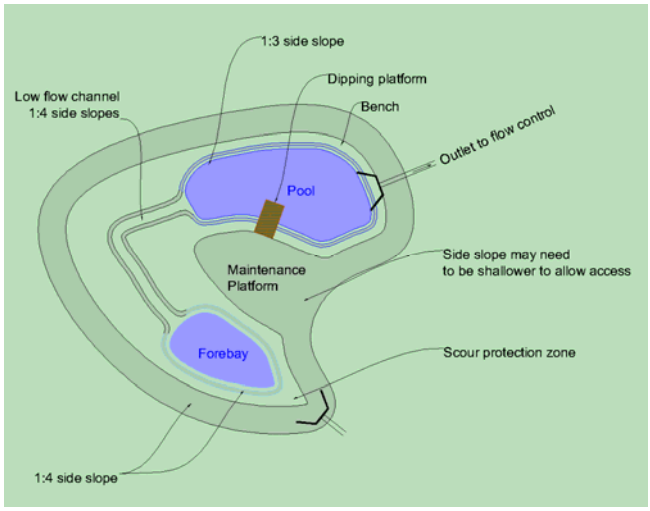
Appropriate corridors should be left to accommodate utility apparatus to avoid a clash between services and the permeable construction.

Roof drainage can be connected to permeable surfacing as long as flows are suitably diffused as to prevent localised overloading of the permeable sub-base.

Attenuation

The first choice for attenuation must be a surface feature such as a pond, wetland or detention basin. Surface attenuation features should be considered for dry weather functions such as play areas where they are not expected to be inundated frequently.

To effectively manage volumes it is best to spread attenuation features throughout the site and it should be noted that many SuDS features such as swales, rain gardens and permeable paving will provide attenuation if outflows can be limited effectively.

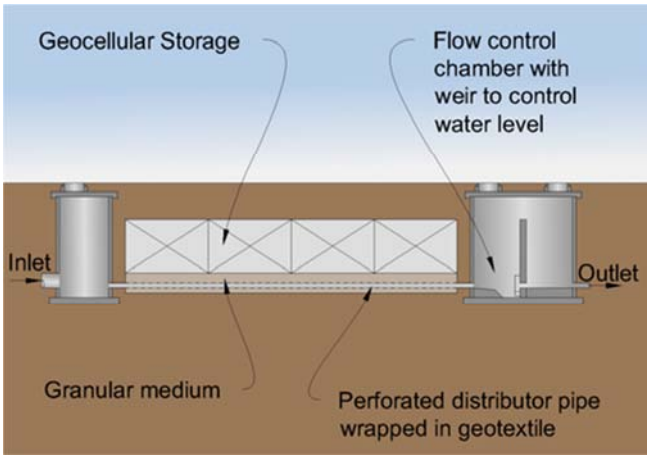


Where ponds can be used to provide storage the opportunity to provide multiple stages of treatment must be taken.

The pond should feature a silt forebay that can be easily accessed for regular maintenance. A low flow channel can be used to route flows from the forebay into the rest of the pond. The flow routing should direct water through the longest possible path to maximise treatment opportunities.

A permanently wet area should be provided, ideally at the outlet, to provide a last phase of treatment.

It is accepted that on some constrained sites dedicated below ground storage will be a necessity. If this is being proposed it must be demonstrated that all surface attenuation options have been considered and shown to make the site . For all below ground features management of silt is a key consideration. The storage volume should either be protected from silt ingress or be easily accessed for silt removal. It should be noted that catchpits are not considered to be effective silt management features.



The preferred arrangement is to have cellular storage underlain by perforated distributor pipes that are wrapped in geotextile and surrounded by granular medium. The volume is filled when water surcharges up from the perforated pipe into the cellular storage. Silt will be retained in the distributor pipes ensuring that there is no degradation of available storage over time.

Flow Control

Traditionally flow controls have been limited to a minimum discharge rate of 5l/s due to the potential risk of blockage. By using SuDS the risk of blockage can be eliminated allowing for lower discharge rates that match the greenfield rates required by SMBC policy. For example, water filtered through permeable paving or a filter drain cannot carry any material large enough to block even a very small orifice.

Given that flow rates can be safely restricted below 5l/s it is expected that all sites will restrict flows to the greenfield Qbar rate and any deviation from this must be justified.

All flow control chambers should have a high level overflow to control levels in the system in the event of blockage or exceedance. The overflow can be in the form of a split chamber with a weir wall or a pipe set high in the side of the chamber that connects to the outlet.

Where flow control chambers are located in Public open Space consideration must be given to regular access by maintenance vehicles.

Roof Drainage

All roof drainage must be connected to single property SuDS. This can take the form of:

- Rainwater recycling systems
- Permeable paving to the front drive
- Rain gardens or planters
- Leaky water butts as long as the leaking water is managed effectively
- Soakaways if appropriate

Susdrain – Ashby Grove

Soakaways

Solihull predominantly has clay soils that are unsuitable for infiltration. Therefore when a soakaway is proposed we will require that full soakage tests are carried out to the method described in BRE Digest 365. Note that extrapolated infiltration rates will not be accepted.

The design of the soakaway should also follow the advice in BRE 365. It will be key to consider managing exceedance flows as soakaways are designed to a 10 year return period. Ideally rainfall in excess of the 10 year event will be safely stored on site or conveyed to the drainage system via an overflow.

4. Designing and Implementing SuDS

While we accept that each site presents its own unique challenges. However, the following section illustrates that when SuDS are effectively planned and designed, they can be delivered to provide substantial benefits to developments while not compromising on the density or layout of the development. This section will step through the context of a proposed development site, assessing the originally proposed development and identifying greater implementation of SuDS.

Site Context

The site slopes from South to North towards an existing drainage channel. There is an existing residential development forming the northern boundary, with the remaining site bounded by countryside.

Original Proposed Development

The originally proposed development accommodated two significant sized attenuation ponds to the North of the site. An underground pipe network serves the development, connecting to the attenuation ponds which have replaced the existing drainage channel. The attenuation ponds in this development control the quantity of water leaving the site; however they provide limited water quality improvements and biodiversity opportunities.

REDESIGNED PROPOSED DEVELOPMENT

The redesigned development contains a range of SuDS features throughout the development. These proposals utilise multiple bioretention and attenuation features to capture, treat and attenuate across the site. This design requires less underground pipe network and significantly smaller attenuation ponds to the north as the surface water is managed across the site. The number of housing plots on the site is the same as the original proposal

5. Maintenance and Adoption

All SuDS applications will require a maintenance plan that shows what operations will be required to maintain the asset. It is recommended that these plans are based on Chapter 32 of the CIRIA SuDS Manual 2015 and they should be clear about which operations are required and which party or parties are to be responsible for them.

SMBC encourage the adoption of SuDS either as part of the highway or as Public Open Space. In either case a commuted sum will be payable. The commuted sum will be calculated on a bespoke basis based on the maintenance requirements for the SuDS features.

APPENDIX 1. REQUIRED INFORMATION

When submitting a planning application for drainage approval we will require certain standard documents. This list is aimed to give a baseline of requirements but more details may be required for some developments.

Information Required	Pre-app	Out-line	Full	S38 / 278
Geology & Ground Conditions	✓*	✓	✓	
Predevelopment plan(s) showing: • Topography • Existing Site Layout • Any and all watercourses and water bodies on the site • Existing infrastructure including public and private sewers • Overland flow routes	✓	✓	✓	✓*
Infiltration testing results, in accordance with BRE 365 guidance	✓*	✓*	✓	
Calculation of greenfield Qbar for the site	✓	✓	✓	
Assessment of treatment train requirements	✓		✓	
Infiltration and contamination potential	✓*	✓*	✓	
Evidence of consideration of all SuDS principles or types of SuDS features	✓*	✓*	✓	
Rationale for SuDS features proposed, including consideration of flood risk, water quality and amenity & biodiversity	✓*	✓*	✓	
Proposed Drainage Plan(s) Showing: • Proposed Topography • Proposed Site Layout including finished floor levels at least 150mm above surrounding infrastructure. • All retained and proposed drainage and SuDS features • Sub-catchment areas, including impermeable and permeable areas • Attenuation volumes, discharge rates and locations • Overland flow paths in the event of blockage or exceedance of the drainage system • Proposed adoptable features and adopting authority		✓*	✓	✓
Evidence of proposed surface water network performance for the 1 in 1 year, 1 in 30 year, and 1 in 100 year plus climate change events including models as well as outputs. (If using MicroDrainage see Appendix 2 for a list of SMBC model requirements)		✓*	✓	✓
Engineering details (where appropriate): • Typical cross-section(s) and detail(s) of proposed SuDS features • Detail of flow control chambers • Detail of highway drainage features			✓	✓
Maintenance Schedule for all drainage features defining which party(ies) are responsible for the future maintenance of each feature.			✓	✓

* Should be provided where available

APPENDIX 2. MICRODRAINAGE MODEL SPECIFICATIONS

When designing a drainage system using XPSolutions' MicroDrainage software the following design parameters should be used if FSR rainfall is to be used:

Return Period (years)	Follow Microdrainage Guidelines
M5-60 (mm)	19.300
Ratio R	0.400
Maximum Rainfall (mm/hr)	0
Foul Sewage (l/s/ha)	0.00
Volumetric Runoff Coeff.	Follow Microdrainage Guidelines
PIMP (%)	Follow Microdrainage Guidelines

Add Flow / Climate Change (%)	0
Minimum Backdrop Height (m)	Follow Microdrainage Guidelines
Maximum Backdrop Height (m)	Follow Microdrainage Guidelines
Min Design Depth for Optimisation (m)	Follow Microdrainage Guidelines
Min Vel for Auto Design only (m/s)	Follow Microdrainage Guidelines
Min Slope for Optimisation (1:X)	Follow Microdrainage Guidelines

When testing a drainage system the following Simulation Criteria should be used:

Volumetric Runoff Coeff.	Follow Microdrainage Guidelines
Areal Reduction Factor	Follow Microdrainage Guidelines
Hot Start	Follow Microdrainage Guidelines
Hot Start Level	Follow Microdrainage Guidelines
Manhole Headloss Coefficient (global)	Follow Microdrainage Guidelines
Foul Sewage per hectare	0.000

Additional Flow - % of Total Flow	0.000
MADD Factor * $10m^3$/ha Storage	0.000
Inlet Coefficient	Follow Microdrainage Guidelines
Flow per Person per Day	Follow Microdrainage Guidelines
Run Time	Follow Microdrainage Guidelines
Output Interval	Follow Microdrainage Guidelines

When using the Seasonal Return Period Wizard simulations should be run for all durations at the following return periods:

1 in	Climate Change
1	0
30	0
100	40

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