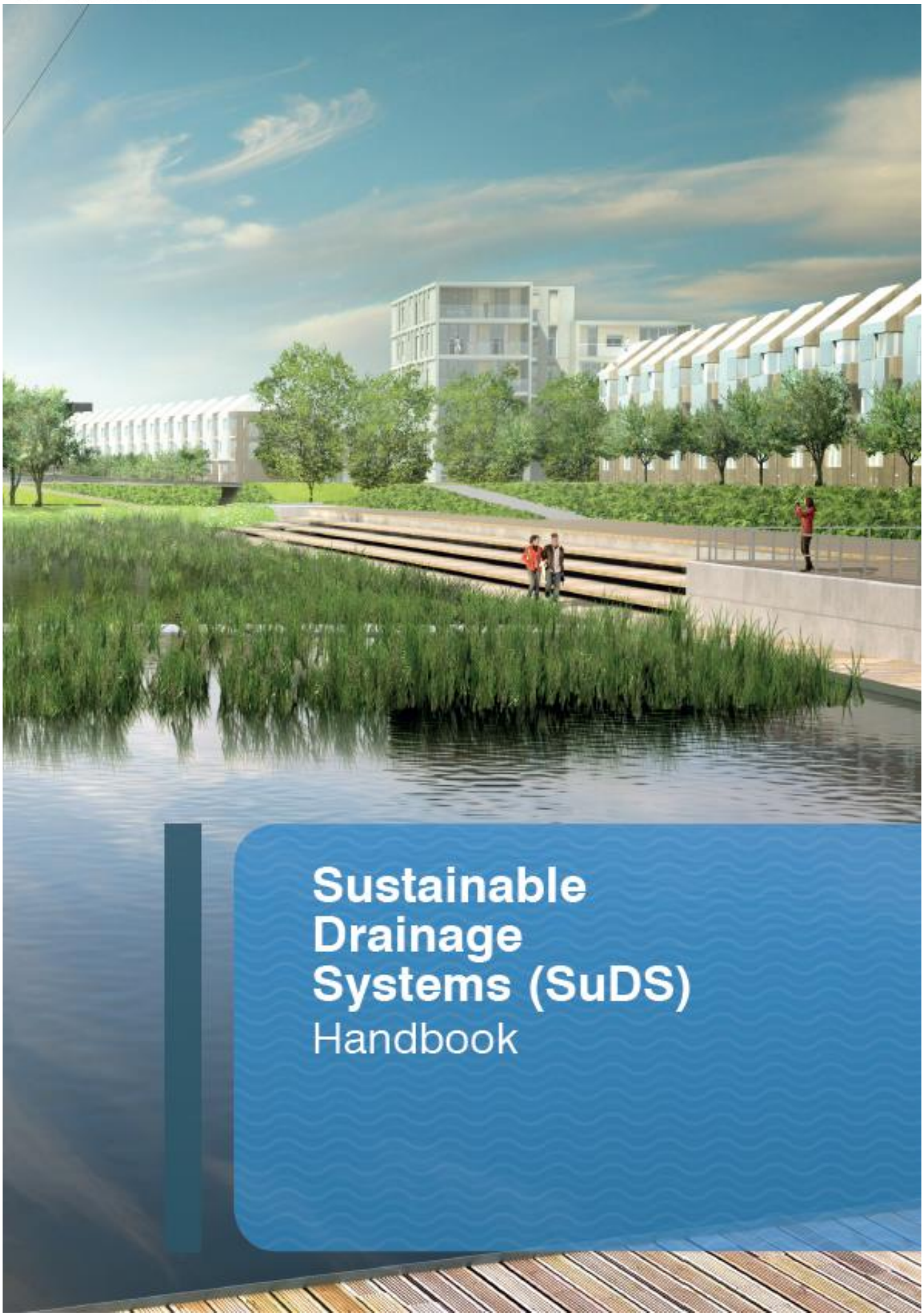
Herefordshire Council



Sustainable Drainage Systems (SuDS)

Handbook

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Sustainable Drainage Systems (SuDS) Handbook

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This was handbook was originally drafted by Arcadis Consulting (UK) Limited on behalf of a working group of West Midlands Lead Local Flood Authorities in accordance with the terms and conditions of appointment for Sustainable Drainage Systems (SuDS) Handbook dated December 2012.

This document has then been further developed by Herefordshire Council and their service providers Balfour Beatty and WSP Parsons Brinckerhoff in 2017.

CONTENTS

The SuDS Handbook was first issued in February 2018. All subsequent changes are listed below.

Issue Date	Amended items
April 2018	3.2 Adoption 6.9 Impact of Flood Risk from Watercourses 8.5 Intervention level for flow control maintenance and orifice sizes
June 2018	1.6 Herefordshire Council Highways Design Guide 2.3 Flood Risk & Drainage Checklist 3.2 Adoption 7.4 Early Development of a foul drainage strategy 7.5 The use of Package Treatment Plants 8.4 Below ground drainage systems 8.12 Soakaways 8.14 Designing to facilitate safe maintenance

These changes are detailed in the SuDS Handbook Change Log that has been uploaded on the Herefordshire Council website.

1 Overview

This Sustainable Drainage Systems (SuDS) Handbook sets out the role of SuDS in achieving sustainable development across Herefordshire, where the Lead Local Flood Authority (LLFA) is Herefordshire Council. Clarity is also provided on the requirements for foul drainage where adoption is not proposed.

Herefordshire Council is a Unitary Authority with combined county and district council powers. The council's remit is to assess all planning applications for development within its unitary boundary.

The SuDS Handbook shows how early consideration of surface water drainage issues can ensure that an effective SuDS scheme can easily be delivered on any site. The Council seeks to promote Green SuDS and so sufficient space needs to be allocated when the site layout is first considered.

This Handbook is not intended to be a prescriptive document, although it does set certain standards which will normally be required as a condition for adoption of the new systems. The Handbook provides a bench mark defining the standards that need to be met to discharge Planning Conditions

It is further intended that new ideas and approaches to design problems should not be suppressed. Developers and their designers are strongly urged to discuss their ideas with the LLFA at an early stage in the scheme.

1.1 What are SuDS?

SuDS are an approach to managing surface water (rainfall runoff) which mimic the natural processes of attenuation, infiltration and evapotranspiration. SuDS comprise a sequence of management practices, control structures and strategies which are designed to drain surface water efficiently and sustainably, whilst also minimising pollution and managing the impact on the water quality of local water bodies.

The SuDS Interim Code of Practice provides an overview of the general SuDS principles. Information and design guidance can be found on the UK SuDS website.

Recent developments that have featured SuDS specified and built to an exemplar standard include :-

- The Furlongs, Holmer Road, Hereford
- New Livestock Market, Hereford

1.2 Statutory SuDS Policies

Section 10 of the National Planning Policy Framework (the NPPF) sets out the expectation that Local Planning Authorities (LPAs), as part of their function of determining planning applications, should avoid flood risk to people and property and should manage any residual risk. Where development is necessary, flood risk elsewhere should not be increased. The NPPF also states that SuDS should be used in development projects and identifies a hierarchy of surface water disposal techniques.

Herefordshire LLFA is a consultee in the planning process and makes recommendations regarding the Planning Conditions that the LPA imposes.

The following policies, strategies and guidance provide the legislative support for the promotion and use of SuDS on all development sites in Herefordshire.

- Policy SD3 (Sustainable Water Management and Water Resources) of the Adopted Core Strategy. Development shall include appropriate SuDS to manage surface water appropriate to the hydrological setting of the site.

- Policy SD4 (Wastewater Treatment and River Water Quality) of the Adopted Core Strategy. All residential development proposals will need to consider the capacity of the drainage network in the area and the impact of future development on water quality

- Neighbourhood Planning Guidance Note 19 Sustainable Water Management in Herefordshire. There are an increasing number of made Neighbourhood Development Plans and applicants should refer to specific policies in developing design proposals

1.3 SuDS Policy regarding Major development

In 2015 the Secretary of State made changes to the NPPF which in turn made SuDS a material consideration in the determination of planning applications for major developments.

Major development is defined by the Town and Country Planning Order 2010 as any development involving any one or more of the following:

- The winning and working of minerals or the use of land for mineral-working deposits;
- Waste development;
- The provision of dwelling houses where the number of dwelling houses to be provided is ten or more; or dwelling houses are being proposed on a site of 0.5 hectares or more.
- The provision of a building or buildings where the floor space to be created by the development is 1,000 square metres or more;
- Development is carried out on a site having an area of one hectare or more.

The Council expect to see SuDS used in all developments as appropriate to the size and nature of development. Accordingly the SuDS Handbook defines the drainage standards required for major and non-major planning submissions. Different levels of scrutiny will be applied to major developments proportional to their scale.

For non-major development (i.e. development that does not meet the criteria above) we encourage evidence that sustainable drainage (SuDS) has been considered. Drainage issues will continue to be subject to existing planning policy, accordingly SuDS need to be applied to any development and demonstration of compliance with the SuDS hierarchy will always be required. Runoff requirements will be imposed in compliance with Council Policy. It is however recognised that implementing effective SuDS on small sites (particularly replicating Greenfield runoff rates) can prove difficult.

For small developments, the Water Companies may insist on restricted discharges into their surface water sewer network. Accordingly attenuation will be required and so SuDS may be required on some small sites.

This SuDS Handbook has been prepared to be relevant to all types of development. The nature of the SuDS system will be dependent on the scale and type of development. Best practice SuDS are considered a requirement for major developments.

1.4 National Standards and Local Standards

The 2015 CIRIA SuDS Manual forms a basis for all SuDS design. DEFRA published 'Sustainable Drainage Systems: Non-statutory Technical Standards for Sustainable Drainage Systems in March 2015 to ensure a consistent approach to the design and enforcement of SuDS across the country. A Best Practice Guidance Document has been published by the Local Authority SuDS Officer Organisation (LASOO) which provides further interpretation and guidance in relation to the National Standards.

However, LLFAs and Local Planning Authorities can set local standards to complement national requirements and to prioritise local needs. The National Standards and the local SuDS Standards are included in dark boxes throughout this handbook. These apply to all drainage submissions irrespective of size.

Compliance of the SuDS submission may be checked by cross referencing to the list of Local and National Standards uploaded onto the Herefordshire Council website.

1.5 Submission requirements based on development scale

The document submission requirements differ according to the scale of the proposed development and are identified on the Flood Risk and Drainage checklist.

For housing estates with 50 + houses, the submission will need to demonstrate an exemplar approach to SuDS design, with all reasonable efforts being applied to implement green SuDS features. In urban areas the LLFA may seek to impose reduced runoff rates in order to mitigate existing downstream flooding problems.

Development Class	Size	Submission
Non Major	1 -5 houses	Basic
	6-10 houses	Moderate
Major	10 – 50 houses	Moderate
	Commercial	Moderate
	50 + houses	Large

1.6 Herefordshire Council Highways Design Guide

Herefordshire Council have published a Highways Design Guide for New Developments. This provides standards for adoptable highways or any highway built to serve 6 or more houses.

All highway drainage aspects have been included in this handbook.

1.7 Strategic Flood Risk Assessment

Herefordshire Council have completed a county wide Level 1 Strategic Flood Risk Assessment (SFRA). This was completed in accordance with the NPPF and includes a summary of flood risk throughout Herefordshire from all sources of flooding, for the purpose of informing land use planning and development control requirements. The SFRA makes reference to this SuDS Handbook for development control policies regarding the sustainable management of surface water runoff and opportunities to reduce existing flood risk through providing betterment.

1.8 SuDS Delivery Partners and their Roles

Consents required outside of the Planning Process are identified in Section 4. Developers are advised to review this section.

Flood risk management in Herefordshire is overseen by the Flood Risk & Drainage Department at Herefordshire Council. Their remit includes the approval of SuDS, Package Treatment Plants and Ordinary Watercourse flood defence consents.

Herefordshire Council must be consulted on any proposed SuDS within or affecting the public highways and those that might impact local rights of way. Herefordshire Council's Highways Team should be contacted as part of the Pre-Application process.

The Environment Agency is a statutory consultee in relation to development within 20m of the top of a Main River bank. A Flood Risk Activities Permit is required for any works within 8m of the river bank or flood defence structure.

Highways England and Herefordshire Council are responsible for adopting and maintaining adopted highway drainage systems serving public highways. Highways England are responsible for the A49, M50/A40 roads in Herefordshire only.

Natural England are consultees for developments in or in the vicinity of Special Areas of Conservation (SAC) and Sites of Special scientific Interest (SSSI). The Magic Map provides an online map of SAC and SSSI sites.

Herefordshire & Gloucestershire Canal Trust maintain stretches of canal throughout the county and are actively seeking to restore the Gloucester to Hereford canal.

As non-statutory consultees, Water Companies can act in an advisory role, commenting on any SuDS schemes that have potential to impact upon existing or proposed sewerage infrastructure. Water Companies must be contacted directly in relation to any proposed connections to, or impacts on, the public sewer network. Developers are required to adhere to the mandatory Water Industry Act Section 104 process if the SuDS and upstream network intends to communicate with the existing public sewerage network.

The Water Company serving the majority of Herefordshire is Dŵr Cymru Welsh Water. Areas along the east and north borders of the county are served by Severn Trent Water Limited. Within Ledbury Dŵr Cymru Welsh Water supply water and Severn Trent treat effluent.

Figure 1.8A Water Companies

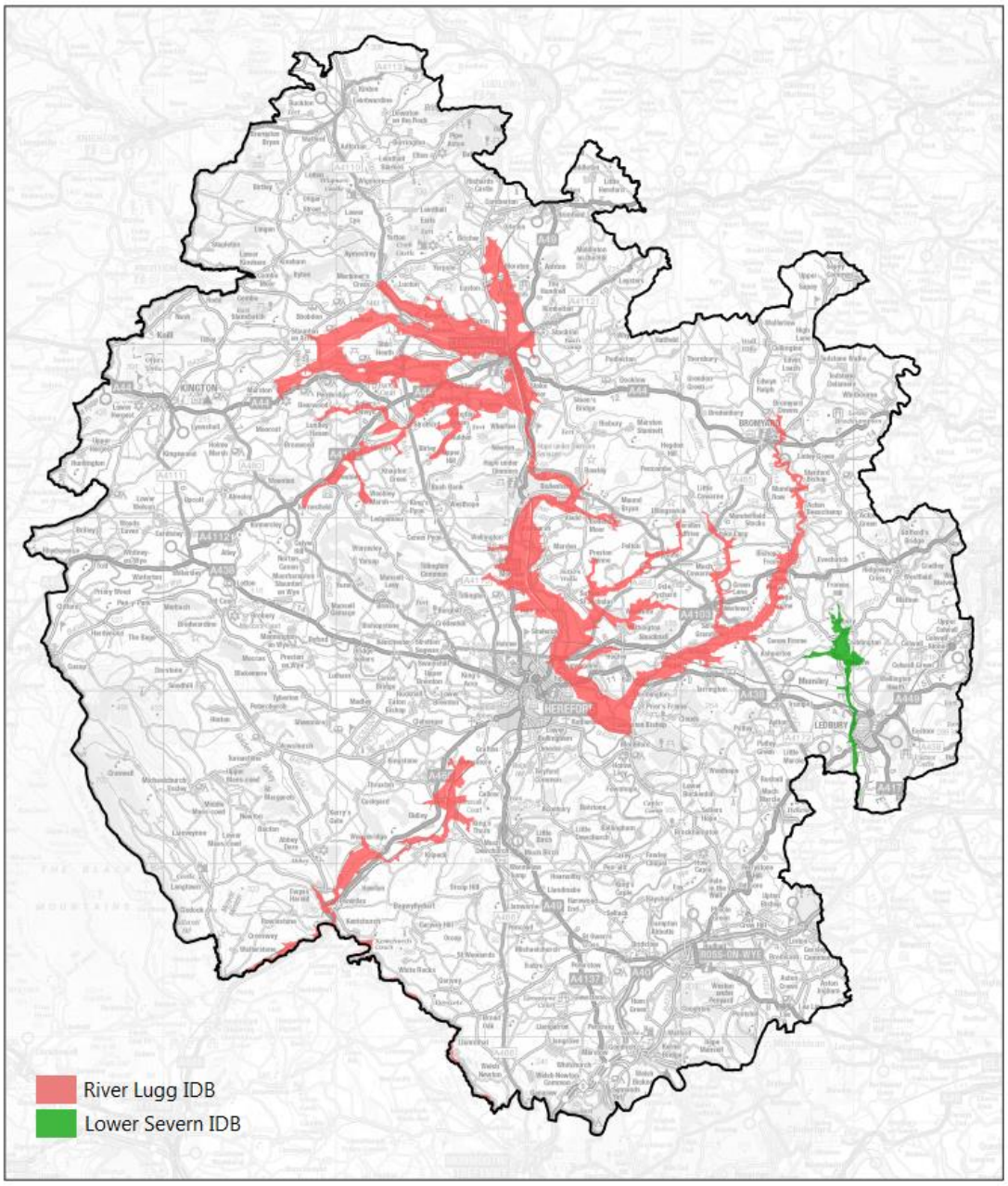

Figure 1.8B Internal Drainage Boards

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Internal Drainage Boards (IDB) should be consulted on any development that will drain into an IDB maintained channel. There are two IDBs operating in Herefordshire: the River Lugg Internal Drainage Board and the Lower Severn Internal Drainage Board.

2 Planning Process

2.1 Major and Non-Major Developments

This SuDS Handbook has been prepared to address the drainage aspects for all developments in Herefordshire.

The legislative requirement to secure planning approval for a proposed SuDS scheme relates to major developments. Planning Policy therefore requires that planning approval for a proposed SuDS scheme is required for all 'major developments' (see Section 1.3 for definition of major development) with surface water drainage implications. Herefordshire Council LLFA hold a duty to review and approve the flood and drainage aspects of major development.

Herefordshire Council may also require SuDS schemes and so may apply planning conditions to other types of development where drainage is identified as a consideration. The review of drainage provision for non-major development and the promotion of the use of SuDS is aligned with established policy.

The Council expect to see SuDS used in all developments as appropriate to the size and nature of development. It is however recognised that implementing effective SuDS on small sites can prove difficult.

2.2 Pre-application Discussion

In order to ensure that development proposals are well planned and that all the required information is submitted, Herefordshire Council strongly encourage developers to engage in the Pre-application process. This should be carried out alongside discussions with other key stakeholders when the development of a site is initially being considered.

Pre-application discussions will help to ensure that SuDS are considered ahead of or as part of the production of preliminary development layouts, and that they are fully integrated into the final development layout.

Evidence of, and outcomes from, pre-application discussions will be used by Herefordshire Council LLFA when considering the suitability of the information submitted with the planning application. If the pre-application advice is heeded it is more likely that the LLFA will not object to the SuDS proposals or request more information thereby avoiding delays on the grounds that a proposed SuDS scheme needs to be revised. Where connections to existing Water Company sewerage is proposed, evidence of dialogue with the Water Company will be required.

2.3 Flood Risk and Drainage Checklist

A Flood Risk and Drainage Checklist has been prepared to help guide applicants and this is available on the Herefordshire Council website. The checklist was promoted to provide clarity regarding the SuDS documentation needed to support development at different stages of planning approval.

To assist those completing drainage submissions for Non-Major development, some entries in checklist have been highlighted (greyed out). The greyed out entries therefore provide an indication of the core items that need to be considered.

Sites of 6 or more houses follow the same process as Major development. The scale of the proposed development will impact on the extent of issues that need to be addressed. The greyed out entries offer useful guidance regarding the issues to resolve or dismiss. The checklist is intended to help streamline the submission to ensure that the key risks are

highlighted and discussed. For some medium scale commercial or agricultural sites, the submission requirements could be close to those relating to a Major development.

Developers promoting low scale development (such as small buildings) will find value in reviewing the highlighted entries as any obstacles will become apparent.

2.4 Submissions

Information relating to drainage and flood risk should be submitted with the planning application to Herefordshire Council Local Planning Authority. The submission may include the outline design package for Section 38 highways drainage adoptions.

The process operates via Herefordshire Council. Whilst discussions with the LLFA are encouraged **any subsequent revisions to the drainage and flood risk information should be issued to Herefordshire Council Local Planning Authority for comment**.

For outline '*major development'* planning applications, Herefordshire LLFA will expect as a minimum that the application is accompanied by the required documentation detailed in 'Flood Risk and Drainage Checklist'. For all applications (non-major or major) this will include a conceptual SuDS scheme that shows the general layout, scale, method of discharge and proposed adoption route.

For Full or Reserved Matters '*major development'* planning applications, the LLFA will expect the application to be accompanied by more comprehensive information to demonstrate that the detailed configuration and performance of the SuDS accords with the relevant Local and National Standards.

2.5 Consultation

Once the planning application has been received, the Local Planning Authority will consult the LLFA and Highway (drainage) department as required.

The LLFA will assess the suitability of a proposed SuDS scheme having regard to the National and Local Standards.

The LLFA will aim to respond to the consultation from the LPA within 21 days.

As part of the planning process, Herefordshire Council will consult, as necessary, the following statutory and non-statutory consultees:

- Dŵr Cymru Welsh Water or Severn Trent Water if the proposed SuDS system interacts with the public sewer system.
- Environment Agency if (i) the proposed SuDS system will discharge directly to a watercourse classed as 'Main River or is within 20m of the river bank; (ii) is within Flood Zones 2 or 3; (iii) discharges into Source Protection Zone 1.
- Highways England if the proposed drainage system is likely to impact on existing A49, M50/A40 road drainage.
- Natural England if the proposed site is likely to impact on relevant SACs/SSSIs 'Impact Risk Zone'.
- The Herefordshire and Gloucestershire Canal Trust if the proposed SuDS system will discharge directly or indirectly to a canal.
- River Lugg Internal Drainage Board or Lower Severn Internal Drainage Board if the SuDS system will discharge directly or indirectly to a watercourse managed by the IDB

- Local authority colleagues, such as those providing environmental, health and safety and emergency planning advice, as required.

In reviewing the drainage submission, Herefordshire Council do not become responsible for the performance of the drainage system should flooding occur. This duty ultimately lies with the designer, construction contractor and/or maintenance contractor.

3 Adoption and Maintenance of SuDS

3.1 Maintenance

Starting to address the future maintenance and adoption of SuDS at an early stage will speed the agreement in principle with the authority for full planning consent and reduce the need for discharge of conditions being required. In addition, the requirements of the eventual adopter will be criteria that influence the development's layout so will need to be established at the concept stage of the development.

Local Standard A Proposals for SuDS adoption

The Applicant should summarise their proposals for adoption and maintenance of SuDS at Outline Planning Stage. Arrangements for this between the LLFA and Developer should be agreed prior to Outline Planning Permission being granted, otherwise they will be secured via Conditions.

Details of the maintenance agreement are required for full planning approval, whereas an agreement needs to be in place for discharge of conditions.

For most types of development reviewed by the LLFA, a Maintenance Plan will be required to facilitate Discharge of Conditions as follows:

- For individual plots the Maintenance Plan could be contained on a few as-built drawings. For Discharge of Conditions, a design drawing showing the drainage needs to be available for subsequent presentation to the land owner

- Where plots are divided for sale to multiple landowners and in this case jointly owned drainage assets are to be created. In this situation the Maintenance Plan would not need to refer to any SuDS assets being presented for Section 104 adoption by a Water Company.

- For all major developments where the SuDS assets would not be adopted by a Statutory Authority.

Designing for safe maintenance is further discussed in Section 8.14.

3.2 Adoption

Drains that convey surface water from the adoptable highway must be adopted by a Statutory Authority. Within Herefordshire this means the Water Companies, Herefordshire Highways or Highways England.

Options for the maintenance of SuDS are set out in a Table uploaded on the Herefordshire Council website. Although not exhaustive, the options represent what Herefordshire Council considers to be the most likely arrangements for ensuring long term maintenance.

To improve competition, OFWAT have granted Inset Licenses to several water companies to allow them to supply water and sewerage services across the UK. These include Albion Water, Veolia Water and Severn Trent Direct. This trend has resulted in additional companies with statutory powers to adopt SuDS, that can operate in Herefordshire.

Dŵr Cymru Welsh Water

If a Water Company were to take on responsibility for maintenance, then under current arrangements the SuDS system would be included within their ordinary charging scheme. Direct charging may be facilitated if the Water Company offered its services as a Private Management Company.

Welsh Water will not adopt any SuDS features which convey or attenuate water on the ground's surface e.g. swales and ponds. Any features that may convey groundwater into the sewerage system are not permitted. Welsh Water will consider the adoption of tanks, geocellular storage and oversized pipes if designed appropriately.

Information for Developers can be found on their Developer Services web pages. When the receiving water is discharged to a Welsh Water sewer, early understanding of the adoption requirements (including establishing the agreed flow rate) will help formalise a workable SuDS design.

Welsh Water policy dictates that a minimum of 51% of the catchment serving a surface water sewer shall drain property, with a maximum of 49% draining highways.

Where a downstream attenuation basin is proposed to form an integral part of a SuDS system, with the upstream surface water sewerage presented for adoption by Welsh Water, agreements must be in place to ensure that a Statutory Body (e.g. Environment Agency, Local Authority or IDB) takes responsibility for maintenance of the attenuation basin.

Outlets from Welsh Water surface water sewers into land drainage features such as watercourses, ditches and swales need to be in approved locations. Approval is based on a review of the condition of the land drainage feature and an agreement with the riparian owner to receive the stated flow rate from the sewer.

Welsh Water will not adopt Orifice Plates. Flow Controls that restrict flow rates into Welsh Water sewers need to be adopted by Welsh Water.

Severn Trent Water

Severn Trent Water are currently developing their SuDS guidance. Until this becomes available Severn Trent Water Limited should be contacted directly for any discussions regarding SuDS.

Private Landowners

Ownership of SuDS features within the curtilage of private property usually rests with the property owner. This may include permeable paving, soakaways and private drains. Any such assets need to be shown on Property Deeds. Wherever a Statutory Authority are not adopting the SuDS, the Maintenance Plan should be issued to the home owner.

Where SuDS features are laid on land that is identified as jointly owned by residents (including the private land owner) and it can demonstrate that ALL parties have agreed to maintain the SuDS feature, establishment of a Private Management Company may not be required. To facilitate any agreement it will be necessary to circulate a Maintenance Plan to all of the residents.

Internal Drainage Boards

The River Lugg IDB are willing to adopt attenuation basins or ponds that drain into IDB maintained channels. Dŵr Cymru Welsh Water regard all IDBs to be Statutory Authorities and accordingly will adopt incoming the surface water sewers.

Herefordshire Council

Herefordshire Council will adopt SuDS features that take only surface water arising from the Council adopted highway and, where this is the case, an appropriate indexed 60 year commuted sum for maintenance will generally be required. SuDS features (typically Swales, Ponds & Basins and Soakaways) are regarded as Non-Standard items. Any Section 38 adoption agreements for highway drainage systems will clearly state whether SuDS features are included or otherwise.

SuDS features such as balancing ponds or basins (serving Water Company adopted public surface water networks built with incoming adoptable highway drains) can be adopted by negotiation. The downstream pipework and flow control is normally adopted by the Council as a Land Drain.

Where commuted sums are sought, they will be in accordance with the ADPET guidance and will be calculated on 60 year design life.

Highway drainage features such as gullies, drains, catchpits and headwalls may be adopted as Standard Features under the Highways Act (Section 38 or 278) without provision of a commuted sum. Legal easements can be implemented for soakaways built on private land. Surface features such as balancing ponds, attenuation basins and infiltration basins are adopted by means of a land conveyance; a conveyance is not needed if they are located in the highway verge.

Herefordshire Council will not permit upstream SuDS features to have an interaction with the adopted highway drainage system. Therefore any SuDS feature taking roof and drive (private) drainage should not connect to the highways drainage system.

Herefordshire Council will not normally consider adopting any Public Open Space and alternative ‘in perpetuity’ management arrangements will need to be made. However, Balancing Ponds or Basins with bank maintenance strips may be adopted by means of a land conveyance. SuDS features adopted under the Highways Act would normally be constructed on existing highway verge.

An approved Maintenance Plan will be required in support of the SuDS application. Any commuted sum will be calculated prior to adoption and will be based upon the approved Maintenance Plan and the final ‘built’ design of the area.

Past experience identifies that where SuDS features are adopted, any commuted sum is payable in full in advance of completion of adoption. Following 1 years full maintenance of the area by the developer and after Herefordshire Council have approved satisfactory completion on behalf of the Parish Council, the adoption has occurred.

Where developments utilise land in Council ownership, (where the land will be retained by the council) then future maintenance of SuDS will rest with the Council. The provision of a commuted sum would still apply in this scenario.

Private Management Companies

Where SuDS are located on communal land and are not adopted by Herefordshire Council or a Water Company, it is required that the liability for maintaining these assets is bound to the properties that they serve, or alternatively laid on land that is identified as jointly owned by residents. Assets owned by Private Management Companies cannot be located on privately owned land. In cases where Housing Associations develop plots, we encourage the adoption of SuDS features by the housing association.

A Private Management Company should be established to maintain these assets on behalf of the residents. A Maintenance Plan needs to be developed for the Private Management Company to use.

Any Private Management Company should be demonstrably adequately self-funded or will be funded through an acceptable on-going arrangement. The intent is that the Private Management Company will become engaged in the conveyancing process when property is sold. The Council seeks to encourage resident engagement and accordingly the establishment of resident-led Private Management Companies.

3.3 Maintenance of green SuDS features and watercourses by riparian owners

Where green SuDS have been constructed in road verges or otherwise adjacent to properties then the maintenance liability for the SuDS will be the responsibility of the homeowner under Riparian Drainage Law. If there are properties served by the drainage network upstream, any such properties hold a right to discharge surface water and do not hold a duty to maintain the downstream section. The homeowner may delegate responsibility for the SuDS to a Private Management Company to fulfil their maintenance duties on their behalf. Developers should establish a Private Management Company to undertake maintenance on behalf of residents.

If land bordering a green SuDS feature or watercourse has been purchased by Herefordshire Council, then the Council are the riparian owner. If the IDB were to adopt a length of watercourse then they would implement maintenance works in accordance with their terms of adoption.

Should larger SuDS features that service the entire development not be adopted by the council, such as attenuation basins, then they should be built on land that is jointly owned by all the landowners that the SuDS feature(s) serves. This feature may be maintained by a Private Management Company. To avoid future maintenance liability, developers should ensure that properties' deeds have either a joint maintenance liability for the communal assets or a requirement for property owners to be a shareholder of the maintenance company included in the properties deeds.

Access to maintain a watercourse should be provided at all times and buildings should not be placed directly on the banks of watercourses. Property owners need to have access to the bank to facilitate maintenance.

Local Standard B – Access for watercourse maintenance

Layout plans shall demonstrate that the Applicant has considered access for watercourse and ditch maintenance. This shall include consideration of the alignment of boundary walls, hedgerows and fences.

3.4 Public Open Space

Herefordshire Council will not normally adopt new areas of Public Open Space. The following bodies have adopted Public Open Space on residential developments within the county in the past:

- Herefordshire and Gloucestershire Canal Trust
- Parish Councils
- Private Management Companies

Public Open Space may be used as an attenuation area for up to 1 in 100 + Climate Change storm. Formally designated play areas and areas with play equipment may not be used for flood attenuation for storms greater than 1 in 30 years and for managing exceedance flows.

3.5 Formal Records showing asset ownership

SuDS features need to be recorded on property deeds. Where SuDS features are maintained by Private Management Companies, ownership will be allocated to the landowner.

Where shared ownership of a SuDS asset is proposed, the land will need to be registered as jointly owned by residents. Housing Associations may take ownership of land parcels surrounding SuDS features, but the property deeds must explicitly state that they administer the plots on behalf of listed property plots. The SuDS features themselves will be recorded with the property deeds.

Ownership of swales, ditches and pipes will normally remain with the landowner, but for maintenance purposes the assets need to be identified as being part of a communally owned drainage system. A Deed of Easement is required where pipelines cross third party land.

3.6 Formal Records showing asset maintenance

Maintenance duties need to be recorded on property deeds. The developer is responsible for highlighting the importance of maintenance and needs to emphasise that property owners may be liable or may suffer detrimental consequences in future for system failure if they don't maintain it. The Maintenance Plan may cover the entire development but needs to specifically address any duties that landowners have regarding asset maintenance.

3.7 Funding the maintenance of shared assets

Where management companies have been set up on behalf of land owners, to manage shared assets, a maintenance funding stream needs to be secured. Processes need to be put in place to ensure that householders do not default on payments and to ensure that debts are recovered.

Housing Associations have well established billing mechanisms. Herefordshire and Gloucestershire Canal Trust have generated an income stream from residential developments on trust land, they may consider extending a service to large third party developers.

The Maintenance Plan needs to include a short and long term maintenance schedule to demonstrate to land owners the likely frequency of payments. For most residential developments, costs are likely to arise for cyclical or reactive maintenance. Where large expenses are envisaged on an occasional basis the Maintenance Plan needs to identify the need for a “Sinking Fund” to finance any major works.

Interim Payment Certificates will need to be issued to landowners as defined in the Maintenance Plan. This may be on an annual basis but also on land sale.

3.8 Designation of SuDS Constructed on Third Party Land

The Flood and Water Management Act 2010 (Section 30) enables LLFAs to designate features or structures constructed on third party land, which may impact on flood risk, at their discretion. The features or structures may be selected based on the likelihood and impact that failure may impact on site residents or third parties. All designated structures will be recorded onto an asset database. This process may be used to designate private SuDS serving new developments. Once a SuDS feature has been designated and placed on the asset register, formal consent from the LLFA will be required for any changes.

No action on the part of the developer is required; all decisions relating to the designation of SuDS will be made by the LLFA.

4 Consents and Stakeholder Engagement

4.1 Demonstration of compliance

Consents that may be necessary for developers to obtain alongside planning permission are listed below. At full planning application or reserved matters stage, the LLFA will require evidence of compliance with the need for obtaining additional consents, particularly where an inability to obtain these would affect the feasibility of the proposed SuDS system. At the outline planning application stage, the LLFA may request evidence of compliance, where not obtaining such consents would render a proposed scheme unworkable.

4.2 Legal consents – Herefordshire Council & Internal Drainage Boards

Consent	Responsibility for Discharge	Summary
Land Drainage Consents (Land Drainage Act, 1991, Section 23)	IDB where inside an IDB area	This is for works in or on the banks of ordinary watercourses (including culverted watercourses) within areas controlled by the boards that could affect flows, such as new culverts, weirs, outfalls and bridges with supports in the channel. To fully enable a LLFA to implement their new roles and responsibilities in respect of local flood risk, certain functions previously held by the Environment Agency have been transferred. This includes (from April 2012) taking responsibility for the consenting and licensing of all works on ordinary watercourses. The prior written consent of the Lugg IDB is required if it is proposed to erect any structure in or within 9m of the top of the bank of any watercourse under the control of the Board, forms may be downloaded from the Lugg IDB website. A web-based application needs to be made to the Lower Severn IDB. Natural England are consulted when a Land Drainage Consent application is made within a relevant SAC or SSSI Impact Risk Zone
Ordinary Watercourse Flood Defence Consent (Land Drainage Act, 1991, Section 23)	Herefordshire Council where outside an IDB area	This is for works in or on the banks of ordinary watercourses (including culverted watercourses) within areas controlled by the boards that could affect flows, such as new culverts, weirs, outfalls and bridges with supports in the channel The term Ordinary Watercourse Flood Defence Consent is concordant with Land Drainage Consent An application should be made via the Herefordshire Council website Natural England are consulted when a Land Drainage Consent application is made within a relevant SAC or SSSI Impact Risk Zone.

Consent	Responsibility for Discharge	Summary
Connection to an existing highway drain/ adoption of highways drainage (Highways Act, 1980, Section 38 / Section 50) Building over or close to a highway drain (within 3 metres)	Highway Authority	It is illegal to discharge drainage directly on to the highway or to connect private drainage into a highway drainage system without consent. Building over a highway drain is not permitted. Developers are encouraged to contact Herefordshire Council's Highways Department to establish working limits when designing the alignment of S38 highway drains. The 3m easement may be reduced locally dependant on depth and length.
Highways Technical Approval Category 0	Highway Authority	This relates to the design of large drainage structures (900mm or above in diameter) under the public highway
Installing a private drain below a public highway	Highway Authority	Approval of a New Roads & Streetworks (NRSWA Section 50) Licence

4.3 Legal consents – Environment Agency

Consent	Responsibility for Discharge	Summary
Environmental Permitting Regulations (Water Resources Act, 1991, Section 109 and associated byelaws)	Environment Agency	This is for works in, over, under or adjacent to (within 8m) main rivers or river defences. Refer to EA guidance and apply here This type of licence was formerly known as Flood Defence Consent
Environmental Permit (Pollution Mitigation)	Environment Agency/ Local Authority	An Environmental Permit may be required for a business or dwelling which manages or produces waste or emissions that pollute the air, water or land. These cover a range of activities including waste management, pollution prevention and control (PPC) permits, discharge consents, groundwater authorisations, abstraction licensing and radioactive substances regulation (RSR). For Package Treatment Plants, an Environmental Permit is required where the criteria identified in the General Binding Rules are met. Flows and loads need to be defined following guidance from British Water.
Environmental Permit (Groundwater Discharges)	Environment Agency	Consent for discharge of potentially contaminating water within a Source Protection Zone or a Principal Aquifer.

4.4 Legal consents – Water Companies

Consent	Responsibility for Discharge	Summary
Adoption of a sewer (Water Industry Act, 1991, Section 104) Connection to a sewer (Water Industry Act, 1991, Section 106) Building over or close to a sewer	Water Companies	Systems which drain either private areas such as roofs and driveways or highway drainage can be adopted through a Section 104 Agreement. In Dŵr Cymru Welsh Water's area, a Section 104 agreement is mandatory in order to exercise the right to connect under Section 106. Mandatory adoption is required of any asset which is intended to communicate with the sewerage network. Agreement for the connection of Gullies and highway drainage needs to be obtained, with subsequent adoption under Section 38 of the Highways Act. The Water Company will be able to advise how wide the easement is for a public sewer

4.5 Legal consents – Natural England

Consent	Responsibility for Discharge	Summary
Protected Species Mitigation Licences	Natural England	Where proposed works may risk injuring or affecting protected animals or plants. For a full list visit the Gov.uk website. In watercourses and ditches across Herefordshire Great Crested Newts and White Clawed Crayfish have been spotted, consequently mitigation has been necessary.

4.6 Third party landowners – discharge of Surface Water or Treated Effluent discharges from Package Treatment Plants

A legal agreement will need to be in place where a developer proposes to discharge surface water or treated effluent via third party land into a connecting sewer or watercourse or into a third party owned pipe, sewer or drain. Such an agreement would involve the preparation of a legal easement to discharge water by means of a new pipe or conduit. This agreement must ensure that any maintenance duties are clarified. Evidence of discussions with landowners will be required.

Where a watercourse runs parallel with a road, the verge will in most cases be owned by the land owner. If a pipe is proposed crossing below the road, to discharge into the watercourse then written approval for the headwall will be required.

In both cases a Land Drainage Consent would be required.

4.7 Ecological Considerations

Special Areas of Conservation and Sites of Special Scientific Interest

Consultation is required with Natural England for any developments in or in the vicinity of Special Areas of Conservation (SAC) and Sites of Special Scientific Interest (SSSI). The online MAGIC map shows the detailed Impact Risk Zones and assessments for SAC and SSSI sites.

The entire length of the River Wye and the River Lugg in Herefordshire is designated as a Special Area of Conservation (SAC). The River Clun upstream of Leintwardine is designated as a SAC. There are significant areas of land designated as SSSI in the County.

Planning Policy

Core Strategy policy LD1 states that development proposals shall maintain and extend tree cover where important to amenity

Core Strategy policy LD2 requires development proposals to conserve, restore and enhance the biodiversity assets of Herefordshire

Policy LD3 promotes the provision of on-site green infrastructure, particularly where this enhances and/or integrates with the surrounding green infrastructure network. More specifically policies SD3 and SD4 work in combination to promote appropriate SuDS to manage surface water and secure improved river water quality for rivers within the county.

4.8 The Reservoir Act 1975

A Panel Engineer has to be appointed to inspect any reservoir with a capacity over 25,000 m3.

Flood and Water Management Act 2010 (Schedule 4) remains to be invoked, but promoted the concept of reducing the figure to 10,000 m3.

Where bunding has been proposed, Herefordshire Council LLFA have imposed a limit on the size of agricultural attenuation basins to 10,000 m3

Access for maintenance needs to be considered. The Maintenance Plan will need to demonstrate how plant access will be made into the basin without damaging any bunding.

5 Surface Water discharges

5.1 Land Drainage Law

A ‘Ditches and Drainage in Herefordshire: Guidance on landowner responsibilities’ pamphlet is available on the Herefordshire Council website, clarifying land owners rights and duties under Land Drainage Law.

Works in or adjacent to watercourses are monitored by means of Land Drainage Consenting to prevent construction work that may impede the flow of water or cause adverse environmental effects. On ordinary watercourses and ditches, there is a risk of outfalls being constructed so that they partially block the flow of water, for this reason consent is required prior to construction.

5.2 Discharges to highway ditches and new SuDS

Where riparian ditches are present in an existing highway corridor on the edge of development sites, the adjacent land owners have a right of discharge surface water runoff as riparian owners.

However in some cases Herefordshire Highways Authority have purchased land for the purpose of realigning the road carriageway or completing improvement schemes. In this case Herefordshire Council own the ditch and so are riparian owners. Accordingly if an adjacent ditch has been classified as a highway drainage ditch the adjacent landowner does not have the right to discharge surface water runoff. Permission to connect would need to be sought from the Highway Authority.

Most ditches on country lanes are riparian owned, but where the Council has undertaken improvement works or constructed new highways, ditches tend to be classified as highway ditches rather than riparian. If in doubt contact the Highway Authority.

Where Section 38 road adoptions are proposed, subject to obtaining written approval from the Highways Authority, it may be possible to agree a discharge of surface water into the adjoining highway drainage system from new highways at Greenfield runoff rates.

Discharge of treated effluent to highway ditches that drain into highway drains is not permitted. Even if such a ditch were classed as riparian, the landowner does not have any legal right to discharge imported water to it.

In principle, highway drainage designed for Section 38 adoptions may discharge to privately owned green SuDS systems such as Swales (if no Welsh Water sewers are proposed). However the developer is encouraged to discuss their proposals with Herefordshire Highways.

5.3 Culverted watercourses and land drains

Dispersing development runoff via an existing culverted land drain or culverted watercourse is not a favoured design solution. Episodes of flooding have arisen throughout Herefordshire because culverted land drains and watercourses have not been adequately maintained, as riparian owners cannot easily inspect or maintain them.

SuDS are to be designed for a 100 year + climate change design life, so the developer needs to present a strategy to ensure that the culverted watercourse will remain serviceable for the duration of the development. There is a significant risk of culverted watercourses blocking and so in past cases trial pits, CCTV surveys, cleansing and lining have been promoted. Where a development site is reliant on a discharge to a culverted watercourse crossing third party land, the applicant is encouraged to obtain advice from the LLFA.

Greenfield runoff rates would be used to establish the allowable discharge to a culverted watercourse, however, in many cases the runoff would spill across the top of the culverted watercourse and so would not add to the flow in the culvert. The contributing area and approved flow rate would be defined based on the site topography and the size of any receiving ditch. If the culvert is owned by a Water Company then dialogue is required regarding connection rights and discharge rates.

6 Site Information

6.1 Understanding natural site drainage patterns

At all sites an analysis of site topography, geology and soils is required. This will firstly identify the presence of any existing or historical drainage features e.g. existing highway drainage outfalls, culverted watercourses, sewer networks, mill leats or water meadows. Existing watercourses should be integrated into the design for any size of development.

There are a range of tools freely available to do this:

- LiDAR Data available free of charge
- Public Sewer records
- Information on geology and soils, freely available from the British Geological Society
- Historical Maps or National Library of Scotland Maps

6.2 Culverts

Policy SD3 of the Herefordshire Local Plan - Core Strategy states that the Council will, generally, be opposed to the culverting of watercourses and the construction of in channel structures unless there is no reasonable alternative.

Land Drainage Consent is required for the installation of culverts, the extension of culverts or the removal of culverts (there is a risk of increasing flood risk to others up or downstream).

Retention of Natural Drainage Features

Natural drainage features on a site should be maintained and enhanced. Culverting of open watercourses will not normally be permitted except where essential to allow highways and/or other infrastructure to cross. In such cases culverts should be designed in accordance with CIRIA's Culvert design and operation guide, (C689).

Where a culverted watercourse crosses a development site, early discussions are needed to confirm whether the culvert should be reverted back to open channel. In such a case the natural conditions deemed to have existed prior to the culverting taking place should be re-instated.

6.3 Surface water inflows

The Environment Agency publishes maps including the Risk of Flooding from Surface Water map showing surface water flooding. These maps form a useful basis to help understand how surface water drains across larger sites and more importantly whether surface water may drain into the site. There may be additional routes from higher ground that are not shown on the maps that becomes evident from an inspection of the site topography. The Risk of Flooding from Surface Water Map should not be relied on as the only source of information. Where existing roads run along the perimeter of plots, formal or informal highway grips may exist that divert highway drainage into the development plot. Such drainage features may not be visible and so the gradient and cross fall of the road needs to be considered to establish the catchment that drains from the road. In some cases water drains across or along the road to these grips, from adjacent land.

Where highway drainage discharges onto the land via a fixed orifice, the Highways Authority holds a formal right to discharge surface water onto the land. In this situation, the site drainage

design will need to be developed so that the Highways Authority can continue to provide the road with functional highway drainage.

The methodology used in generating the Risk of Flooding from Surface Water Map means that they tend to highlight natural drainage paths and can therefore be used to inform the layout of SuDS features on a site. Where surface water flows enter a development site from outside the site boundary the additional flow may take capacity from the new drainage network or even overwhelm the drains. If a flow route is defined from higher land then the conveyance of this surface water will need to be addressed within the Drainage Strategy. In some cases the catchment boundary may need to be extended beyond the site boundary.

At major sites, 1D/2D hydraulic modelling may be needed to demonstrate the operation of overland flow bypass routes. Where inflows are proposed into the SuDS then these will need to be modelled in MicroDrainage.

Runoff that originates from outside of the site boundary and, in particular, runoff classified as 'land drainage' should not be discharged to the public sewerage system. This will not be acceptable to the water companies.

Where there are known Surface Water flooding problems, Herefordshire Council reserves the right to require new major developments to provide betterment to the existing situation. In this scenario, the developer would be expected to develop a design that intercepted and stored surface water flowing from higher land, rather than creating a spill route through the site.

Any onsite measures should not adversely impact on surface water flow routes and volumes downstream.

Reference may be made to the 2017 SFRA to identify any requirement for detailed surface water flood modelling as defined on national mapping.

6.4 Springs

Herefordshire Highways are aware of known springs that spill into highway drains in the vicinity of **Colwall (Evendine), Wetmore, Yarkhill, Lea, and Peterchurch**.

Historic records of groundwater flooding held by the Environment Agency also indicate occurrences near **Clehonger, Newtown, Tarrington, Much Marcle and Stifford's Bridge.**

Historic records of groundwater flooding held by Herefordshire Council include **Combe** and **Munderfield**

Local road names and house names are often an indication of the presence of springs. Historic Plans also often indicate the presence of springs (reference can be made to websites such as Historical Maps or National Library of Scotland Maps). Discussions with local people may help identify the presence of springs on land uphill of a development plot. Springwater can be trapped by bedrock and may emerge particularly on steeply sloped sites.

On brownfield sites, springs may have been culverted. If land is being purchased for a full inspection may need to be completed (including lifting covers) before the sale concludes.

Development that involves lowering ground levels can lead to existing springs being diverted into excavations. This can present a major problem because in some cases there may not be a suitable surface water outfall for the groundwater. The SuDS design cannot easily be retrofitted to accommodate such an inflow, particularly as the flow rate will vary and is unknown.

Where there is a likelihood of spring water ingress, a shallow SuDS design should be promoted. The Surface Water Management Strategy should explain how the risk of groundwater emergence has been considered and planned for.

6.5 Planning Approval for Soakaways

Disposal of surface water via infiltration to ground should be considered first when developing a SuDS design. Preliminary information on whether a site may be suitable for infiltration can be obtained from the British Geological Survey (BGS) Infiltration SuDS Map (chargeable data), or Cranfield University Soilscape Mapping. The Herefordshire and Worcestershire Earth Heritage Trust can also provide geological information.

For sloping sites, if a layer of impermeable strata exists below the permeable soil at the proposed soakaways, there may be problems as water re-emerges at a lower level. The desk top study needs to consider this risk so that investigative work can be planned.

Site based tests are needed to demonstrate that the soakage rates are suitable and to identify that groundwater level is at least 1m below the pipe invert and the base of unlined infiltration features and conveyance features, as outlined below.

To obtain planning approval for surface water soakaways, testing in accordance with BRE Digest 365 is required. The use of this test is intended to assure the Planning Authority that a satisfactory drainage design can be implemented within the confines of the development plot. It is recognised that the soakaway testing methodology identified in Section H of the Building Regulations is followed on many construction sites, However BRE Digest 365 is considered to provide more robust test results than the Building Regulations Test. Following planning approval, the provision of BRE Digest 365 test results also allows sign off under the Building Regulations.

For package treatment treated effluent fields, the methodology identified in Section H of the Building Regulations is appropriate as it establishes a test parameter for use in the design.

In cases where site access for soakaway testing is impractical, site developers are encouraged to review the availability of historic borehole and trial records held by the British Geological Survey. These can sometimes identify the presence of permeable strata that can be used to develop soakaway designs. This information should be presented at Outline Planning stage, ahead of soakaway tests.

Early provision of soakaway tests at Outline Planning stage provides assurance to the developer at an early stage. If the foul or surface drainage strategy is reliant on adequate soakage rates then the need for an outfall may render the site impossible to develop. If land is being purchased for a development, advanced soakaway testing may need to be completed before the sale concludes.

The following flow charts indicate the normal process to obtain planning approval for the use of soakaways and unlined conveyance features (swales). This process may alter depending on the site conditions and soakaway proposals.

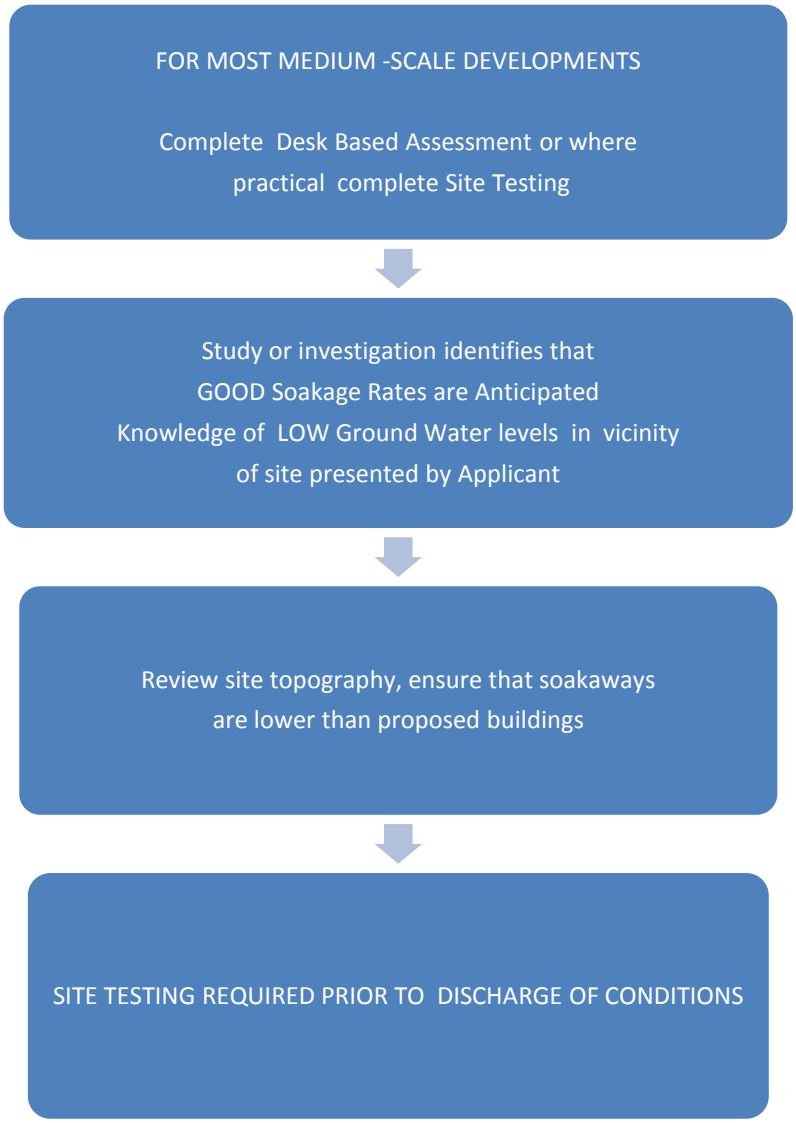


Figure 6.5.1 Soil Tests prior to Discharge of Conditions

Where soil conditions are questionable, site investigation results are needed to support a Full Planning Application.

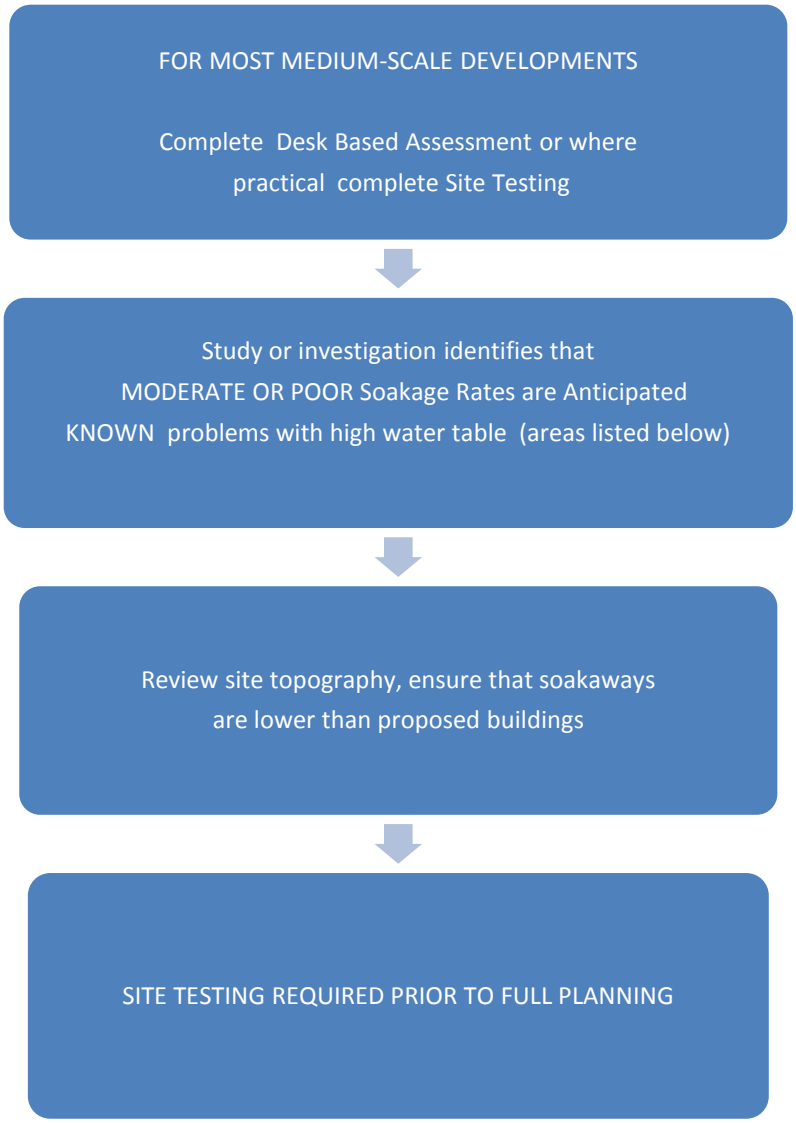


Figure 6.5.2 Soil Tests prior to Full Planning

For small Non-Major developments (e.g. one or two houses), the Council applies a risk based approach to establish the need for site investigation results.

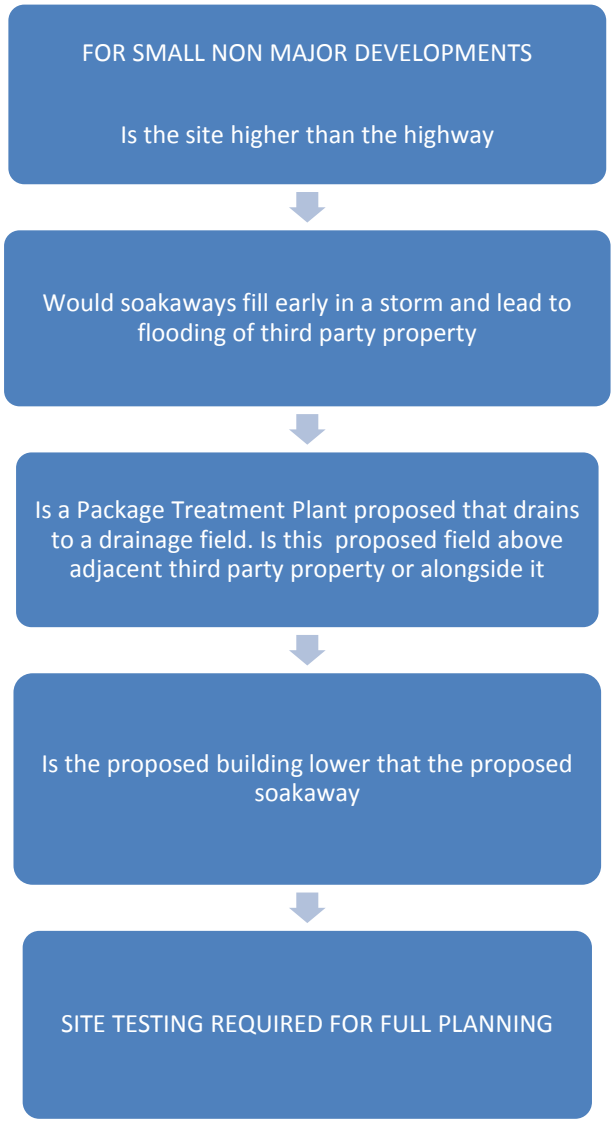


Figure 6.5.3 Risk Based Approach for Soil Testing at small Non-Major Developments

Herefordshire Specific Issues that can affect the need for early site testing

It is highlighted that there have been difficulties associated with the use of soakaways (both surface water and those serving package treatment works) in the following areas within the county:

- A high water table in **Allensmore / Thruxton**
- High water table and surface water flooding inundating soakaways in **Hampton Bishop**
- Low ground porosity in the Wrigglebrook area of **Much Birch**. Steep slopes have resulted in foul effluent from septic tanks ponding on the ground surface
- Low ground porosity with some flooding problems in **Letton**, **Winforton**, **Willersley, Kingsthorne, Bredenbury and Maund Bryan**
- Floodplain of River Lugg e.g. North side of **Aylestone Hill**.

Good soakage rates have been reported in districts in the vicinity of Ross on Wye and Weston under Penyard

6.6 Soakaway Testing

Where infiltration drainage techniques are indicated to be potentially viable, soil testing is necessary to quantify soakage rates.

All soakaway tests for Surface Water drainage applications shall comply with BRE Digest 365.

Three tests are required in each case. The pits should be between 0.3m – 1.0m wide and approximately 1m – 3m long.

The number of test pits will depend on the size of the development. On larger sites the drainage design will need to be informed by several test pits. In cases where a desk study has demonstrated that the soil type may change, the test pits need to be located to demonstrate the conditions in different soil strata.

A plan should be provided demonstrating that the test pits were excavated at the locations of any proposed infiltration features. The depth to groundwater should also be shown.

The Building Regulations soakage test promotes the use of a shallow pit. The guidance suggests that the depth difference between 75% and 25% full can be as little as 150mm. This guidance of a 150mm drop does NOT relate to the BRE 365 test. During the BRE 365 test a pit is excavated down to pipe discharge level and then filled with water to the surface level, accordingly the 75% to 25% depth difference is greater.

The minimum calculated infiltration rate for a given location should be used for design purposes.

6.7 Groundwater Levels

Where unlined storage and conveyance features are proposed, the depth to groundwater also needs to be determined. The groundwater needs to be a minimum of 1m below the invert of any incoming pipework to ensure that the performance of the drainage system is not compromised.

Where groundwater levels are above this level, but below the proposed infiltration zone a design featuring lined SuDS may be suitable. In this case groundwater may rise slightly following heavy rain but water may be retained above the liner. This type of drainage system is considered preferable to resorting to piped soakaway systems or below ground structures. Lined permeable paving and swales can also function well with high groundwater tables.

For major applications sites that have high ground water (e.g. estates with 20 or more houses), or are at risk of it, it is advisable to have an extended period of monitoring of groundwater levels to identify fluctuations or seasonal variations.

6.8 Contaminated Land

Within Herefordshire, issues related to land contamination needs to be considered when redeveloping former petrol stations and historic industrial sites in urban areas. At former landfill sites (Belmont and Stretton Sugwas) the presence of a clay cap will prevent the use of conventional soakaways.

In all cases of land contamination remediation should be considered in the first instance. However if this is not possible, then land contamination should not be considered as rendering a site unsuitable for SuDS. Solutions such as impermeable geotextile liners can be used to limit the movement of contaminants. Although some SuDS components may not be appropriate due to the potential for re-mobilising pollutants in the ground, there are a number of techniques which can be used.

For sites such as former petrol stations, it may prove possible to use soakaways if they are located upstream from potential sources of contamination.

Using liners to prevent infiltration into the underlying ground may enable the use of swales, wetlands, ponds and permeable paving. Lined SuDS can still make a positive contribution on contaminated sites by enabling evapotranspiration, as well filtering of run off.

As SuDS tend to be shallow there is likely to be less disruption to any contaminated ground during installation compared with a traditional piped drainage system.

Where soil conditions are questionable owing to the history of the site, site investigation results are needed to support a Full Planning Application.

The Welcome Break case study below details a successful scheme at a site where land quality was a constraint.

CASE STUDY: Welcome Break, Wheatley, Oxfordshire

6.9 Impact of Flood Risk from Watercourses

Where a SuDS design relies on the use of components which attenuate and convey storm water (e.g. attenuation ponds, basins or swales), these should not be situated within Flood Zone 3. During a flood event, such features would be at risk of filling with fluvial floodwater thus rendering them ineffective for storm water management. **Where practical the invert of attenuation ponds or tanks should be above the 100 year +CC level**. Discussions with Herefordshire Council are encouraged at an early stage because this criteria will have implications for the site layout.

When river levels are high, the performance of the flow control may be inhibited. In such situations more water will be diverted into the attenuation storage, causing it to fill earlier in the storm and so flooding may occur at low manholes or gullies. In this case a MicroDrainage simulation needs to be provided that demonstrates the implications of a submerged outfall. This may demonstrate that alterations are required to the SuDS design to ensure Greenfield runoff rates are achieved without the drainage system flooding.

Outputs from the hydraulic model of the Yazor and Widemarsh Brooks are available as flood maps with corresponding water levels in a graphical format. This data is chargeable and available on request from Herefordshire Council. If required, the hydraulic model may be issued under licence to support the preparation of Flood Risk Assessments.

Local Standard C - Impact of Downstream Water Levels

If high water levels within a receiving watercourse into which a SuDS scheme discharges are anticipated, the LLFA will expect that they will not adversely affect the function of that SuDS system.

6.10 Existing Utilities and Drains

It is illegal to build over or close to a public sewer or a highway drain without first gaining approval. Build over policies have been developed by both Welsh Water and Severn Trent which are rigidly adhered to.

Utility providers hold specific criteria regarding maintaining adequate cover and facilitating safe maintenance. These guidelines need to be strictly adhered to in order to allow utility companies to complete maintenance works.

All known utilities should be shown on drawings issued with the planning submission, aligned with surface features such as inspection covers and surface markers. This is needed to facilitate safe working and to ensure that features of the proposed design do not conflict with the utilities.

Where highway drainage has been designed for subsequent adoption under Section 38 by the Highways Authority, it may become necessary to present trial pit records demonstrating that the alignment and level of utility services have been proven.

7 Design Principles

7.1 SuDS design principles

The three key principles of SuDS design are outlined below

Table 7.1 Summary of SuDS Design Principles

Design Criteria	Key Principles
Water quantity (hydraulics, flooding, runoff)	People and property protected from all flooding sources, including watercourses, the drainage system and overland flows. Drainage hierarchy is followed. Development does not exacerbate flood risk in the wider catchment. Flow rates and volumes of runoff managed to agreed levels. All discharge consents complied with.
Water quality (pollution control, management)	Mitigate potential pollution risks by the use of the SuDS management train. Provide adequate retention time to enable pollutants to be treated. Allowance made for treating the 'first flush'.
Amenity and biodiversity	Seek to positively influence urban design and landscape value through provision of green space / blue corridors, vegetation and by integrating water into the built environment. Create SuDS which are appropriate to the distinctive local context which will enhance landscape character and quality. Encourage multiple uses of open space. Address and design out health and safety concerns.

7.2 Early development of a Surface Water Drainage strategy

Pre-application discussions are always encouraged. At Outline Planning stage, a robust Surface Water drainage strategy needs to be developed and approved, that addresses the key issues discussed below. The strategy needs to demonstrate how best practice SuDS has been considered. Evidence to support the strategy is presented at Detailed Planning stage.

With early consideration, SuDS are possible on any site. However in some cases where sites are gently graded or flat and where ground conditions inhibit use of soakaways, early consideration of the drainage design is essential. This early action will prevent the need for future alterations to the site layout plans as attenuation features are added.

Evidence has shown that both capital and maintenance costs for SuDS should not be greater than those for traditional piped surface water drainage systems, and in some cases can be lower. Flat sites favour the use of SuDS drainage schemes. As SuDS are near the surface, and hydraulic gradients can utilise free-surface routing, the difference in excavation requirements (and therefore cost) by avoiding deep pipework and storage tanks can be very great.

It is important to recognise that all below ground storage structures only provide attenuation of surface water runoff and not treatment. Cleaning of surface water runoff, before entering below ground structures, is required before release to the environment. Silt interception and management arrangement is critical to long-term effectiveness of below ground structures (due

to blockage and siltation risk, as well as water quality) and this must be demonstrated at design stage.

In the majority of cases a SuDS solution can be found that is compliant with the National Standards. In a minority of cases there are challenges in developing a cost effective design, such sites need to be identified early in the planning process.

The inclusion of conceptual SuDS at the master planning or development site planning stage has the greatest effect on their viability and cost-effectiveness. It will also affect their integration with the development and the ability of the SuDS to deliver multiple benefits.

Phased Development and Drainage Strategies

For phased developments, planning applications should be accompanied by a drainage strategy which takes a strategic approach to drainage provision across the entire site and incorporates adequate provision for SuDS within each phase.

The Riverside Court case study demonstrates implementation of a successful SuDS scheme on a site where space was a significant constraint.

CASE STUDY: Riverside Court, Stamford

7.3 Selection of SuDS Features

Once the existing drainage characteristics of the development site are established, the SuDS features that best suit the development proposals can be selected. Tools which provides initial guidance on the potential for implementing SuDS on a development site are available from UK SuDS.

The figures below show the respective SuDS features along with a Constraints & Opportunities Matrix.

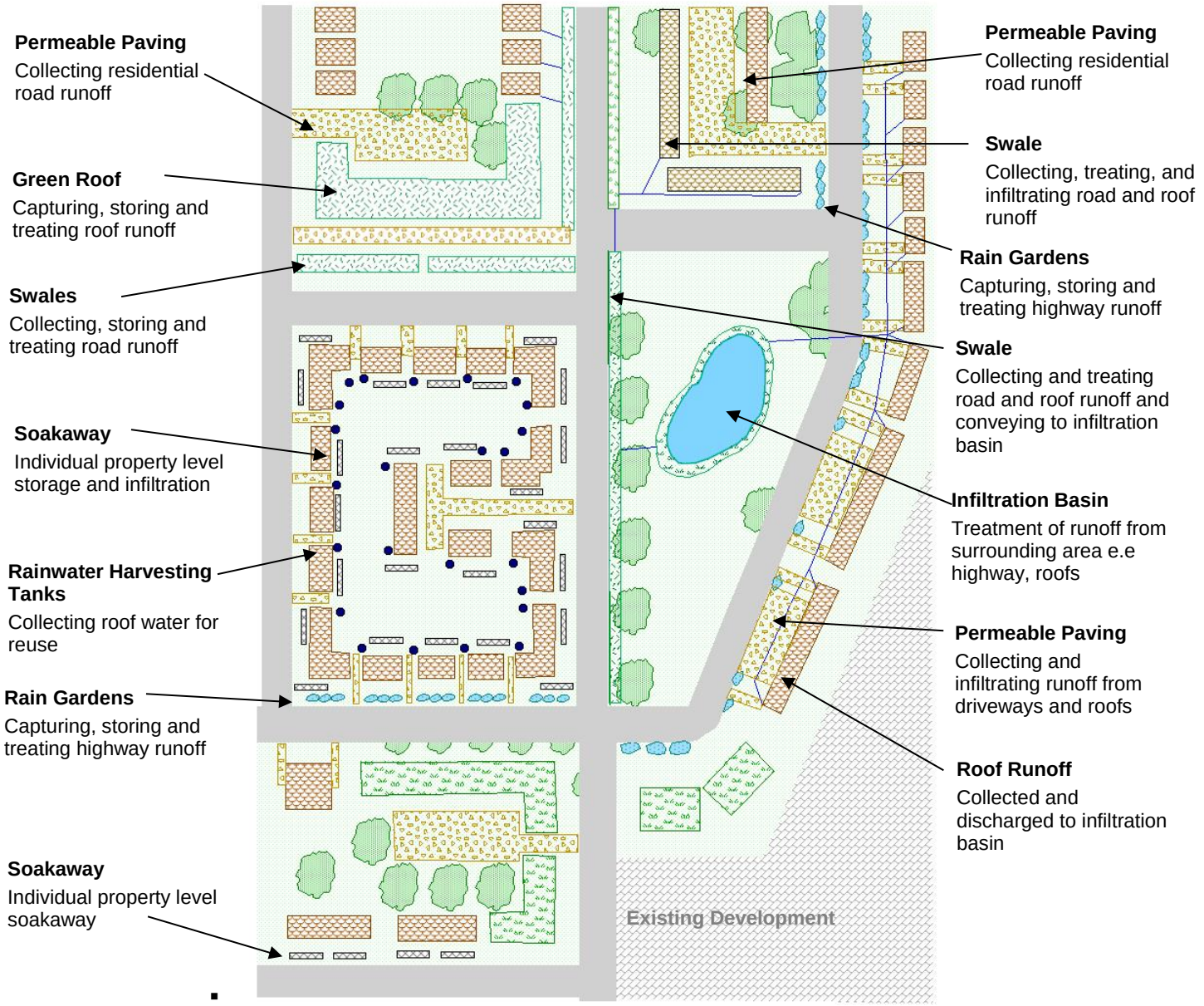


Figure 7.3A Example Development Overlying Soils with High Infiltration Rates

(adapted from Birmingham City SuDS Guide, Arup 2016)

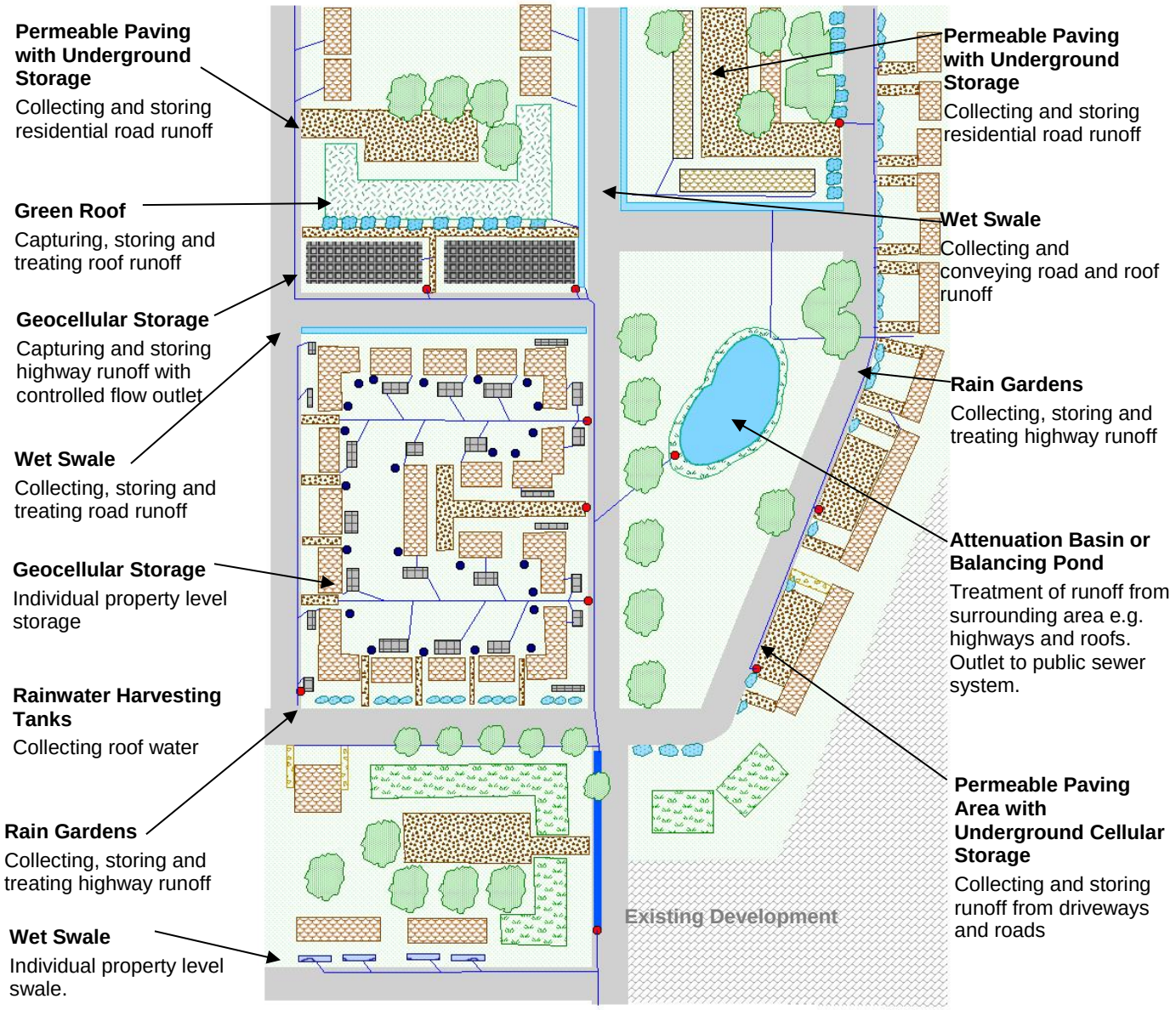


Figure 7.3B Example Development Overlying Soils with Low Infiltration Rates

(adapted from Birmingham City SuDS Guide, Arup 2016)

		Constraints							Opportunities						
SuDS type	SuDS Component	Poor Infiltration	High Groundwater	Steep topography	Flat topography	Contaminated land	Dense Development	Small Site	Attenuation	Pollutant removal	Silt Removal	Biodiveristy enhancement	Amenity Value	Open Space Provision	Infiltration
Ponds & Wetlands	Balancing Pond	Y	Y	M	Y	Y(1)	N	N	Y	Y	Y	Y	Y	N	N
	Wetland	Y	Y	M	Y	Y(1)	N	N	Y	Y	Y	Y	Y	M	N
Storage	Infiltration Basin	N	N	M	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y
	Attenuation Basin	Y	Y(1)	M	Y	Y(1)	N	N	Y	Y	Y	M	Y	Y	N
	Subsurface Storage	Y	Y(1)	Y	Y	Y(1)	Y	Y	Y	N	N	N	N	N	Y
Conveyance	Swale	Y	Y	M	Y	Y(1)	M	M	M	Y	Y	M	M	N	Y
	Filter Strip	Y	Y	Y	Y	Y	N	M	N	Y	Y	M	M	N	N
	Filter drain/trench	Y	Y(1)	M	Y	Y(1)	Y	Y	M	Y	Y	N	N	N	Y
	Canals and rills	Y	Y	M	Y	Y	Y	Y	N	N	N	N	Y	N	N
Source Control	Green Roof	Y	Y	Y	Y	Y	Y	Y	M	N	N	Y	Y	M	N
	Rainwater harvesting	Y	Y	Y	Y	Y	Y	Y	M	N	N	N	N	N	N
	Permeable Pavement	Y	Y(1)	N	Y	Y(1)	Y	Y	Y	Y	Y	N	N	N	Y
	Soakaway	N	N	Y	Y	N	Y	Y	M	N	N	N	N	N	Y
	Bioretention/rain gardens	Y	Y	Y	Y	Y(1)	Y	Y	M	Y	Y	Y	Y	N	Y

Notes for SuDS Selection Table 7.3C:

Y - component is compatible and/or provides benefit

M - component is somewhat compatible and/or provides some benefit

N - Component is unlikely to be compatible and/or provide benefit

(1) if lined

Table 7.3C – SuDS Selection

7.4 Early development of a foul drainage strategy

A robust foul drainage strategy needs to be developed at Outline planning stage. A robust design is essential to ensure the adequacy of the installation.

The use of Packaged Treatment works should only be considered after a gravity or pumped discharge to a public foul sewer has been considered. Guidance identifies that for new development built within 30m of public foul sewer, a connection should be promoted. However we still encourage the provision of connections where property is located further from adjacent sewers. Adoption of foul pumping stations by the Water Companies can also be considered.

The sewer records do not show all of the public foul sewers, particularly the Private Sewers that were transferred in 2010.

If it is proposed that a Package Treatment Plant should discharge to ground, the availability of flat land for the soakage field shall also be considered.

For new developments, Herefordshire Council promote the use of Package Treatment Plants above the use of Septic Tanks. The use of cess pits will only be permitted in exceptional circumstances and where it can be demonstrated that sufficient precautionary measures will ensure no adverse effect upon natural drainage water quality objectives

7.5 The use of Package Treatment Plants

A robust design is essential to ensure the adequacy of the installation. **Cross connections discharging treated effluent to highway drains are NOT permitted.**

If the design is reliant on soakaways then the developer must complete soakaway testing at an early stage. Soakaway Testing will need to be completed before Planning Permission is granted, this item will not normally be listed under Discharge of Conditions. If land is being purchased for a development, advanced soakaway testing may be to be completed before the sale concludes. The availability of flat land for the soakage field shall also be considered.

Calculations are required to demonstrate compliance with the General Binding Rules. Flows and loads need to be defined following guidance from British Water.

Drainage fields for Package Treatment Plants are to be designed in accordance with Section H of the Building Regulations (Section 1.26 onwards). The soakage test methodology should follow Section 1.34

Drainage fields serving Package Treatment Plants should be located:-

- At least 10m from any watercourse or permeable drain;
- At least 15m from any building (7m from single buildings in accordance with BS 6297)
- Sufficiently far away from other soakaways so that the overall soakage capacity of the ground is not exceeded;
- Away from potable water mains.

No access roads, driveways or paved areas should be located within the disposal area.

We recommend and support the use of individual package treatment plants for residential properties.

Natural England have stipulated rigid limits on phosphate discharges as outlined in Binding Rule number 17. Development needs to be implemented in accordance with The Nutrient Management Plan. Accordingly discharges restricted from Package Treatment Plants to watercourses is not possible in some areas of Herefordshire unless suitable secondary phosphate removal systems are installed and adequately maintained. If such apparatus is installed, then home owners need to be made aware of their maintenance duties, including replenishing dosing chemicals.

The spreaders should be laid at a maximum gradient of 1 in 200. As a consequence, on sloping sites the spreader pipes will not be shallow. Accordingly the soakage tests will need to demonstrate that groundwater was not identified 1m below the proposed pipe invert at the deepest point and that the soil has an adequate permeability at a low level.

The ends of the spreaders must be connected together to allow the treated effluent to circulate freely. If this feature is missed when the drainage field is constructed, the ends of the soakaway gradually clog with debris and the field becomes increasingly ineffective.

Where site investigations demonstrate the presence of river gravels or similarly permeable soil and high permeability rates have been proven, it may prove possible to discharge treated effluent into a geocellular crate or circular soakaway. In this case approval would be determined on a risk based approach which would consider the implications of discharging treated effluent to groundwater. Surface water drainage would need to drain to a separate soakaway.

Headwalls serving Package Treatment Plants should be located at least 7m from any watercourse or any building. The route of the ditch needs to be shown on drawings issued as part of the planning application.

Outfalls from Package Treatment Plants into watercourses and ditches should follow guidance in the General Binding Rules, particularly item 19 (discharges to seasonal watercourses). The Environment Agency may insist on provision of an Environmental Impact Study for developments seeking to utilise a seasonal watercourse for the discharge of treated effluent, ahead of any application for an Environmental Permit. Where it is proposed that treated effluent may discharge to a dry ditch or watercourse, tertiary treatment needs to be considered and the Herefordshire Council Land Drainage department should be contacted for advice. It is important that developers should take early steps to ensure that there is sufficient space within the development to install a drainage mound parallel with the receiving ditch.

Wherever possible pumped discharge of treated effluent should be avoided. Storage shall be provided to cater for the scenario of pump failure, in accordance with the Building Regulations.

The use of a drainage field serving two or more properties will only be permitted if a Private Management Company is set up to manage land that is held in joint ownership (of all land owners that are served by the foul drainage scheme). In this scenario the Private Management Company would also be responsible for maintaining the Package Treatment Plant. Herefordshire Council reserve the right to review any such applications on a case by case basis; for small residential developments, individual drainage fields and plants are recommended and supported.

Foul water pumps are liable to block and are a potential liability for domestic homeowners. Where practical foul drainage networks should be set out to eliminate the need to pump raw sewage. Owing to the risk of blockage and surface water ingress, external foul water pumps should be located a minimum of 7m from domestic or commercial property. Package Treatment Plants can be located at low points, with treated effluent pumped uphill.

7.6 Management (or Treatment) Train

A central design concept is the SuDS “management train”, which uses a variety of drainage techniques in series to incrementally reduce pollution, flow rates, volumes and frequency of runoff.

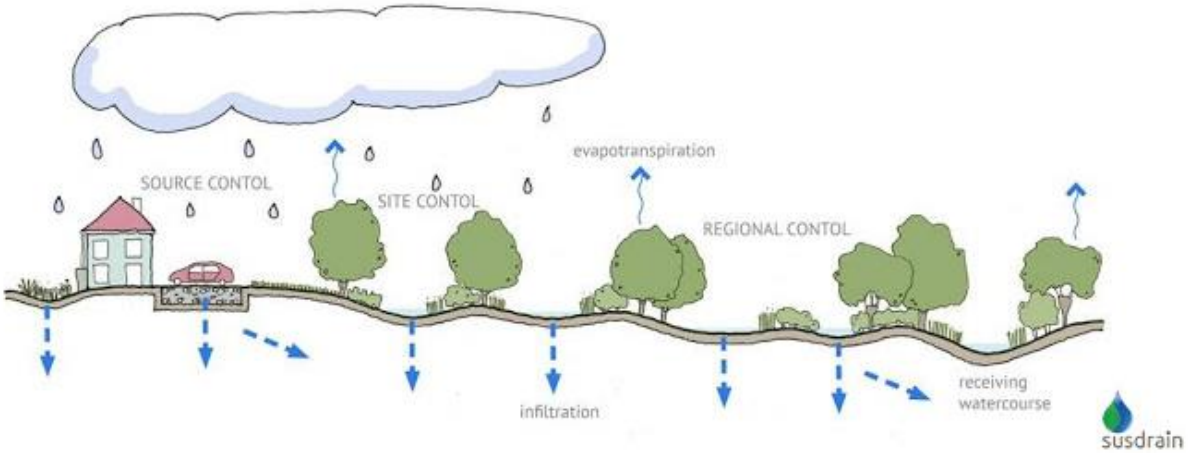


Figure 7.6 The SuDS “management train”

(Source: www.susdrain.org)

The SuDS management train requires that surface water runoff is minimised as far as is practicable. This can be done by reducing the area of impermeable surfaces on the development site. Measures should also be put in place to reduce any pollution associated with surface water runoff such as keeping paved areas clean and containing processes likely to generate contaminants.

Local Standard D – Conformity with the SuDS Management Train Principles

The LLFA will expect the SuDS design to follow conventional SuDS practices and demonstrate how the principles of the SuDS Management Train have been taken into account

Management of the ‘First Flush’

Of particular importance is the need to capture the ‘first flush’ of contaminants which occurs when rain falls on surfaces with pollutants such as oils and petrochemicals lying on the surface. The first flow of surface water off the site will consequently wash the majority of these pollutants away resulting in a greater initial pollution load.

To mitigate the impact on receiving watercourses, SuDS should be developed with the intent of preventing runoff for rainfall events up to a depth of 5mm.

Local Standard E – Pollution Prevention and Control

The LLFA will expect the Applicant to demonstrate how pollutants are prevented or controlled as part of the SuDS scheme. This should include consideration of the sensitivity of receiving waterbodies and particular attention should be given to the first 5mm of rainfall (‘first flush’ that mobilises the most pollutants).

Source Control

Any surface water arising after preventative measures have been implemented should be first managed at source using measures such as permeable paving, individual soakaways and localised swales.

Road gullies and catchpits installed on roads and car parks are designed to intercept silt and may be considered as a pollution control feature if a maintenance strategy is proposed.

Either a gently graded Swale (a gently graded grassy channel) or a Filter Strip (a gently graded grassed area often draining into a Swale or a Filter Drain) will facilitate the interception of silt from surface runoff. However where used in conjunction with surface water drainage networks, to remain effective the swales shall be located in the upstream parts of the system where flow rates are low.

Developers in Herefordshire have built swales that feed into privately owned piped systems. However, Welsh Water will not adopt the downstream piped drainage network in this scenario owing to the risk of groundwater ingress.

Site Control

Surface water in excess of what can be managed using source control methods should then be managed at a site level. Site control should incorporate SuDS features capable of conveying and accommodating surface water flows from a number of source controls distributed across the development site. Examples will include swales for conveyance, ponds and basins. Such measures will further reduce and attenuate surface water flows leaving the development site.

Regional Control

Finally, a regional control may also be employed to provide one last level of quality improvement and quantity reduction. This is likely to be relevant for larger scale development sites only.

Runoff need not pass through all the stages in the management train. It could flow straight to a site control, but as a general principle it is better to deal with runoff locally, returning the water to the natural drainage system as near to the source as possible. The number of treatment stages required is dictated by the source of surface water and the sensitivity of the receiving watercourse. For example, roof runoff will be much lower in contaminants that highway runoff and will therefore require fewer treatment stages. Adding treatment stages improves the water quality as the water spends longer in treatment and consequently the opportunity for pollutant removal is enhanced.

7.7 Designing for control of pollution

The methodology defined below provides a framework for assessing the risk of water pollution as a result of a development. This method has been refined for Herefordshire, it is meant as broad guidance and will not be suitable for all developments nationwide.

A risk based approach is applied, based on the scale and location of the planning application, to minimise the environmental impact of diffuse pollution associated with runoff.

The Environment Agency are statutory consultees for development within Groundwater Source Protection Zones. Where extensive development is proposed,with discharge to ground that will infiltrate down toward underlying groundwater, the requirements for pollutant retention capability may be higher than for discharges to surface water systems.

If the development poses an exceptional risk, or it poses a risk to an exceptionally sensitive area, then this guidance may not be applicable, for example:

- Areas used for handling and storage of industrial/agricultural chemicals and fuels.
- Areas used for handling and storage of waste (including scrap-yards).
- Areas used for handling and storage of animal or human waste.
- Cemeteries and areas used for human remains.
- Trunk roads or motorways.
- Deep infiltration features (such as boreholes).

This guidance does not seek to address any requirements that may be forthcoming from consultations with the Environment Agency.

7.8 Selection of pollution control features

For any development except those classed as having a Negligible Risk Rating, the applicant will need to demonstrate compliance with the SuDS Manual (C753). For most developments, the applicant will need to present at least two stages of treatment within their drainage strategy. Options for treatment are listed at the bottom of this section.

The methodology below only needs to be followed for Major development (as defined in Section 1.3).

The LLFA will impose planning conditions to impose the provision of pollution control features where surface water discharges may have a detrimental environmental effect. However, if SuDS are designed effectively and treatment stages are incorporated as outlined in this manual, then as a matter of course the design will meet with DEFRA SuDS guidance on water cleanliness.

At Strategic Sites, an exemplar approach to the design of SuDS is required, accordingly site layouts should seek to incorporate green SuDS which mimic natural processes to cleanse water.

The SuDS Manual (C753) identifies commercial yards, delivery areas and industrial parks as a likely source of Suspended Solids and Hydrocarbons.

Where a part of the development will be adopted by a statutory body such as Herefordshire Council or a statutory water company, the requirements of the adopting body may take precedence over the methodology identified below. In these cases, alternative solutions for pollution control should be considered and agreed on a case by case basis.

In order to assess the potential risk and therefore the level of treatment that may be necessary, a Development Risk Rating is first established, as follows:

i) Identify a Site Risk rating (Table 7.8.2).

ii) Identify a Receptor Risk rating (Table 7.8.3), based on the condition at the proposed outfall AND any sites within 1 km up or downstream of the outfall (the highest rating is carried forward).

iii) Use Matrix 7.8.4 to identify the Development Risk rating.

The presence of national or international ecological designations such as SSSI's, SAC's (or their relevant Impact Risk Zone) and Local Nature Reserves should be identified within the planning submission.

The Site Risk and Receptor Risk ratings presented by the developer will be open to challenge by Herefordshire Council.

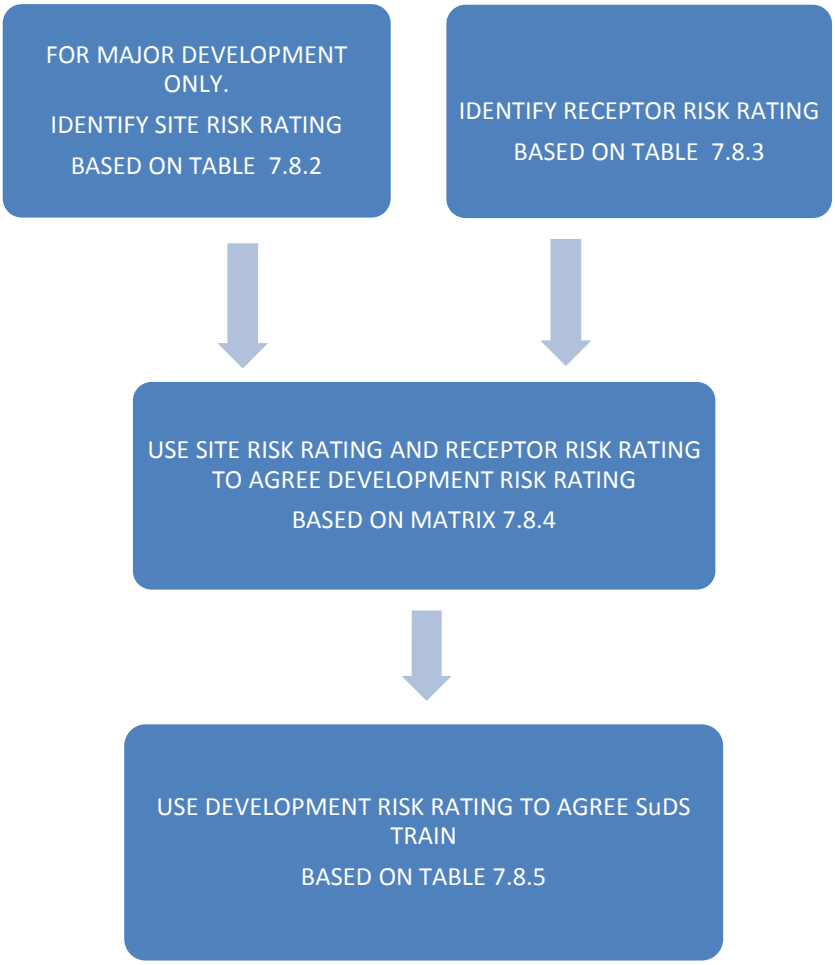


Figure 7.8.1 : Using Risk Ratings to inform a pollution mitigation strategy

Table 7.8.2: Guidance for 'Source Risk Rating'

Risk Rating	Source
Negligible	Applicant is able to demonstrate a negligible change in pollution risk.
Low	Outfall serves development in rural area Residential development with less than 200m^2 of road/parking surface*. Retail office or industrial sites with area under 1ha.
Medium	Residential development in urban area with 200m^2 to 800m^2 of road/parking surface*. Retail, office or industrial sites with area 1ha to 5ha. Agricultural development of less than 1ha with potential to generate surface water runoff with increased sediment loading / organic pollutant loading.
High	Residential development in urban area with greater than 800m^2 of road/parking surface*. Car parks with frequent vehicle change, larger than 800m^2 in urban area or which include lorry, bus or coach parking/turning areas. Traveller sites with 30+ pitches. Retail office or industrial sites in urban area with area 5ha+. Agricultural development of more than 1ha with potential to generate surface water runoff with increased sediment loading / organic pollutant loading.

*Road surfaces on cul-de sacs serving 5 or less houses are ignored in the above guidance.

Table 7.8.3: Guidance for 'Receptor Risk Rating'

Risk Rating	Receptor
Negligible	Applicant is able to demonstrate that there is no pathway for pollution from the site to reach the receptor or that it will not be adversely affected by any pollution which is able to reach it.
Low	Receiving ditch or swale is typically dry during fair weather. Normal surface water body. Secondary aquifer/unproductive strata. Surface water sewer network.
Medium	Environment Agency have raised concerns for development within Zone 2 or 3 of a Ground Water Source Protection Zone.
High	Specific surface water outfall restriction has been identified by Herefordshire Council or Natural England. Environment Agency have raised concerns for development within Principle Aquifer or Zone 1 of a Ground Water Source Protection Zone.

A 'receptor' is any area which could be sensitive to water pollution and is within 1km of the surface water outfall from the site.

Table 7.8.4: Guidance for 'Development Risk Rating'

Development Risk Rating		Highest Receptor Risk Rating			
		Negligible	Low	Medium	High
Site Risk Rating	Negligible	Negligible	Negligible	Negligible	Negligible
	Low	Negligible	Low	Medium	High
	Medium	Negligible	Medium	Medium	High
	High	Negligible	High	High	Very High

One way of capturing the first flush of rainfall is by using suitably designed and maintained permeable paving or filter drains.

The number of sustainable drainage features needed in the SuDS Train to facilitate cleansing is based on the Development Risk Rating as shown in Table 7.8.5.

Table 7.8.5: Guidance for forming a suitable pollution mitigation strategy

Development Risk Rating	SuDS Management Train
Negligible	No treatment required
Low	At least 2 stages of treatment
Medium	At least 3 stages of treatment
High	At least 4 stages of treatment. For commercial developments where a caretaker will visit the site this should include a proprietary pollution control system, unless it can be demonstrated that the benefit would be negligible.
Very High	At least 4 stages of treatment. This must include at least 1 proprietary pollution control system.

A single ‘stage of treatment’ might include (but is not limited to):

- A Swale
- A Filter Strip
- A Soakaway
- A Basin
- A Pond
- The use of trapped road gullies (or beany blocks with silt traps) throughout the site

The following features can be considered to provide two stages of treatment:

- Permeable paving
- A Filter Drain
- A Basin or Pond with a forebay
- A Basin, Pond or Swale which includes vegetative treatment.

Where surface water discharges to dry ditches or ephemeral watercourses, the downstream feature may be regarded as an integral component of the SuDS design.

Balancing ponds or basins built off-line from watercourses can drain via Rip Rap. If the Rip Rap is away from trafficked areas and maintained with the Pond or Basin then this feature can serve as a single stage of treatment.

A ‘proprietary pollution control system’ might include (but is not limited to): A proprietary oil separator; a proprietary sediment separator. In most cases where a ‘proprietary pollution control system’ is required, the device will be needed to reduce levels of suspended solids, heavy metals and hydrocarbons, accordingly a Sediment Separator will be required. For industrial parks or commercial yards, Oil Interceptors may be required.

Pollution Prevention Guideline 3 ‘The use of oil interceptors for surface water drainage systems’ has been withdrawn. However, we consider that this guidance note provides valuable advice. PPG3 is therefore used by Herefordshire Council for specifying Oil Interceptors.

8 Design Criteria

8.1 Runoff Rates

Detailed SuDS design guidance (including Greenfield runoff calculations) is freely available on the Susdrain Website and in the 2015 CIRIA SuDS Manual (refer to Table 24.1).

Greenfield runoff rates and volumes should be calculated using one of the following two methods:

- The FEH Method
- The ReFH Method

Post-development runoff rates and volumes should be calculated using one of the following three methods:

- The ReFH Method (initial design estimates and simple sites only).
- Variable PR runoff method.
- UKWIR runoff model

The calculations should utilise 2013 Rainfall Data.

In the absence of a robust evidence base, the 1 in 1 year Greenfield runoff rate should be taken as 2 l/s/ha.

Runoff rates specified by the LLFA will take precedent over the discharge rate set by Dŵr Cymru Welsh Water or Severn Trent Water Limited as long as the rate set by the LLFA is more restrictive.

Where the development plot discharges to a main river, the Environment Agency are a statutory consultee. In such cases the Runoff rate will be specified by the Environment Agency.

8.2 Polytunnels and Solar Panel developments

For such developments, runoff will be discharged into concentrated areas and will not shed evenly across the ground's surface as per the natural greenfield scenario. Instead, the runoff would most likely saturate the receiving area of ground more quickly and create concentrated overland flow channels.

Consideration must be given to a higher rate and volume of runoff in the design of drainage and attenuation systems serving these sites. The appropriate runoff characteristics will depend on local site conditions and proposed site management practices, but as guide (dependent on site layout) we recommend that the Applicant assumes that between 50-70% of developed areas respond as greenfield land, and that between 30-50% of developed areas respond as impermeable surface. Of key importance will be the demonstration of resilience within the proposed drainage system to accommodate uncertainty during extreme events without increasing flood risk elsewhere.

8.3 Peak Flow and Volume Control

Herefordshire Council follows national guidance for peak flow and volume control as outlined in the National Standards for Sustainable Drainage.

For large developments on Brownfield sites, guidance in item B7 of the above guidance indicates the concept of returning the site to replicate a Greenfield development. Following negotiation, Herefordshire Council reserves the right to insist on the lowest flow rates (in terms of peak flow and volume) related to a 20% reduction in existing Brownfield runoff rates.

Surface water runoff rates and volumes from Greenfield development sites need to closely replicate existing Greenfield runoff rates.

Larger developments, and in particular any strategic development sites, are likely to be required to go above and beyond the minimum requirements – for example by providing betterment over existing discharge rates and demonstrating an exemplar approach to the design and incorporation of SuDS.

DEFRA have identified Peak Flow and Volume Control standards that developers must follow, that provide definite criteria regarding runoff limits, as outlined below.

National Standards for Peak Flow and Volume Control

Peak flow control

S2 For Greenfield developments, the peak runoff rate from the development to any highway drain, sewer or surface water body for the 100% Annual Exceedance Probability rainfall event and the 1% Annual Exceedance Probability rainfall event should never exceed the peak Greenfield runoff rate for the same event.

S3 For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 100% Annual Exceedance Probability rainfall event and the 1% Annual Exceedance Probability rainfall event must be as close as reasonably practicable to the Greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event.

Volume control

S4 Where reasonably practicable, for Greenfield development, the runoff volume from the development to any highway drain, sewer or surface water body in the 1% Annual Exceedance Probability, 6 hour rainfall event should never exceed the Greenfield runoff volume for the same event.

S5 Where reasonably practicable, for developments which have been previously developed, the runoff volume from the development to any highway drain, sewer or surface water body in the 1% Annual Exceedance Probability, 6 hour rainfall event must be constrained to a value as close as is reasonably practicable to the Greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event.

S6 Where it is not reasonably practicable to constrain the volume of runoff to any drain, sewer or surface water body in accordance with S4 or S5 above, the runoff volume must be discharged at a rate that does not adversely affect flood risk.

The design must demonstrate within the design and up to the 100yr + climate change event, i.e. contained within the site so as not to increase risk to people and property elsewhere, OR with a

clear overland flow path that will not affect people and property now or in the future. The storage does not all have to be provided below ground, Where a piped drainage system is used, surface storage can be used to accommodate the attenuated volume above the 30 year storm.

Adherence to the Climate Change guidance released in 2016 further increases the resilience of the SuDS scheme.

Lead Local Flood Authorities sometimes use the 30 year storm as a bench mark for Greenfield Runoff Rates. For Major developments, Herefordshire Council reserve the right to insist on adherence to Greenfield volumes and flows that relate to a 30 year storm.

8.4 Below ground drainage systems

National Standard for Management of Flood Risk

Flood risk within the development

S7 The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30 year Rainstorm.

Design Specifications

Guidance contained in Sewers for Adoption (7th Edition) requires the provision of a drainage design that does not result in flooding from the system (above or below ground features) up to a 30 year storm. This guidance needs to be followed even if the drainage system is not adopted by a Water Company.

Highway Drainage serving highways built to adoptable standards (even if not presented for S38 Adoption) should be designed following the Design Manual for Roads & Bridges. This specification includes some approved deviations from details in Sewers for Adoption, including the use of Silt Traps (instead of manholes). Highway drainage designs for adoptable highway should feature Silt Traps.

For developments serving 6 or more houses, the highway drainage shall meet adoptable standards irrespective of whether the highway is offered for adoption.

Highway Drainage local design criteria

Carrier pipes shall be minimum 225mm diameter. However, drainage serving soakaways may utilise 150mm diameter pipework.

Pipes laid with less than 1.2m cover should be provided with a Class Z bedding (Concrete Surround).

Gully spacing shall be determined using the recommendations of HA 102/00, Spacing of Road Gullies. Gullies will be required immediately upstream of pedestrian crossing points and road junctions but shall never be located on a crossing point. It is the developer's responsibility to demonstrate and ensure that the number and positioning of gullies is adequate to drain the highway.

Alignment of drains within and alongside Adoptable Highway

Lateral connections into public foul or surface water sewers shall be designed and constructed to adoptable standards. All such connections shall run at right angles to the centreline of the road to minimise their length.

All prospectively maintainable highway drains shall be located within land that is to be adopted by the Highway Authority. Only in exceptional circumstances will they be permitted in land that is to remain private. Where such circumstances do arise the land owner at the time of completing a Section 38 Agreement will be required to give a grant of easement keeping 3m each side of the pipe clear of all obstructions, which will be binding on successors in title. The developer is strongly advised not to sell any land that will contain a highway drain before completion of such an Agreement. The Highway Authority will not accept any different form of undertaking, which dilutes the rights conferred on it.

8.5 Intervention level for flow control maintenance and orifice sizes

Overflows located upstream of flow control devices shall be installed to ensure that overflowing water is visible, to prompt blockage clearance. On small sites, a leaking manhole cover can be used as an overflow. Highway drains do not need to be specified with internal overflows.

The LLFA will promote the use of small orifices where it is considered that a maintenance strategy can be practically implemented. For industrial or commercial premises the discharge rate shall be limited to 2 l/s in a 100 year + CC rainstorm, or the Greenfield runoff rate if higher.

For agricultural developments, bunded attenuation basins featuring minimum 75mm diameter flow controls are in some situations considered acceptable. The applicant needs to demonstrate use of a shallow bunded system to facilitate a low discharge rate and contrast this with the Greenfield discharge rate. A perforated pipe can be installed vertically to allow drain down in the event of a blockage, facilitating subsequent clearance by operatives.

If the surface water drainage system is proposed for S104 adoption by Dŵr Cymru Welsh Water or Severn Trent, then advice regarding the discharge rate regarding should be sought from the respective Water Company, as they will be adopting the flow control (Welsh Water do not adopt Orifice Plates but adopt Hydrobrakes).

Runoff from S38 Highway Adoptions should be diverted to soakaways where practical. Where discharge to ditches, watercourses, or existing highway drains has been agreed with Herefordshire Highways, the discharge rate shall be limited to 5 l/s in a 1 in 100 year + CC rainstorm or the greenfield runoff rate if higher. Flow controls need to be located in an area that can be safely accessed by operatives.

For residual areas of residential developments such as driveways and roofs, attenuation may be provided serving multiple properties. In this case because of the reduced blockage risk it is considered practical to limit flows to 2 l/s in a 100 year + CC rainstorm, or the Greenfield runoff rate if higher.

For development sites where a highway adoption is not proposed, the discharge rate will be determined on a case by case basis.

8.6 Extra measures to limit discharge rates

Where the LLFA considers that the development plot is located where it could exacerbate existing flooding problems and a discharge rate of 5 l/s in a 100 year + CC rainstorm has been established, additional measures to limit discharges may be required. This may include the use of vegetated and unlined conveyance and storage systems that promote evaporation and

infiltration into upper soil layers. These measures will reduce runoff during smaller events thereby offsetting the higher discharge rate.

Where the development is too small to warrant the use of storage features such as attenuation basins and below ground storage, SuDS techniques appropriate to the development are to be implemented to maximise the other benefits – principally slowing down the rate of discharge, maximising infiltration potential, improving resilience to climate change, providing treatment and enhancing biodiversity. These could include techniques such as rain gardens, green roofs, filter strips, permeable paving, swales and filter drains.

8.7 Flood Risk to Property

National Standard for Management of Flood Risk

Flood risk within the development

S8 The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 100 Year Rainstorm event in any part of: a building (including a basement); or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development.

For drainage designs based on soakaways, the provision of surface features to contain floodwater within the development may be considered (at multiple locations). Where attenuation is being used with a flow control the same approach can be taken, usually at one location on the drainage network. Depending on the site topography it may be possible to allow floodwater to be stored in parking areas and gardens, making use of features such as:-

- Tall kerbing on estate roads
- Communal soft landscaping areas
- Raising large plots marginally to trap rainwater. Where above ground storage areas have been defined, walls or concrete bases of garden fences can be used to help trap rainwater. In this case the alignment of all openings in the wall or fence need to be considered.

Where piped networks or channels are used, the system shall be designed to accommodate the flow arising from a 30 year storm. SuDS that utilise surface flow routes (swales, ditches, channels or even informal spill routes) for design storms in excess of 30years are likely to be more resilient than below ground systems and this will facilitate optimum use of any downstream attenuation.

Civil 3D CAD calculations and topographical surveys may be presented to demonstrate the extent (volume) of any surface storage.

Inflows of surface water from higher ground needs to be considered during any such review.

For major developments on sloping sites, measures will be needed to reduce the likelihood of rainwater draining down the site in an uncontrolled manner. One such measure may be to include the provision of incremental storage areas higher up the site. This storage may hold water for a short length of time to ensure that the drainage features located in lower areas of the site can function adequately up to the 30 year storm. Other measures include the installation of additional gullies or using traffic calming measures to provide a barrier to flow. The developer would need to demonstrate how smaller rainfall events will also be managed for sloping sites.

8.8 Designing for Exceedance

Developers need to demonstrate that that runoff should not exceed Greenfield rates for a 100 year storm, as outlined above. This includes consideration of the Design Scenario (Central climate change projection) & Test Scenario (Upper End climate change protection as outlined in Section 8.10

As a result of extreme rainfall the capacity of a SuDS system will be exceeded from time to time; when the rate of surface water runoff exceeds the inlet capacity of the system, when the pipe system becomes overloaded, when the system becomes blocked or when the outfall becomes restricted due to flood levels in the receiving watercourse.

SuDS systems cannot always economically or sustainably be built large enough for extreme events. Excess water (where system capacity is exceeded and known as exceedance flow) must be conveyed above ground. This may travel along streets and paths, between buildings and across or towards open space or other lower vulnerability areas such as car parks. Careful design of a site will ensure that these exceedance pathways are appropriately defined to reduce flood risk to people and property.

This must be demonstrated within the design and up to the 100 year + climate change event – i.e. contained within the site so as not to increase risk to people and property elsewhere, OR with clear overland flow path to an adjacent watercourse that will not affect people and property now or in the future.

Most drainage systems, particularly those that drain by gullies, have insufficient capacity to cater for large rainfall events, even though the downstream systems may be designed for those events. It is therefore necessary for developers to consider how, in these events, surface water will be temporarily retained on the site before it can be discharged through the drainage system.

How exceedance flow for a 100 year + climate change (Test Scenario) event is dealt with by the design must be demonstrated in the application. Containment within the site or clear overland flow paths to adjacent water courses are examples of methods to ensure the risk to people and third party property is not increased as a result of the development.

Freeboard should be provided for land drainage features such as basins and ponds. This allows for the risk of blockage from organic debris, setting out errors and difficulties in excavating ponds to achieve the design volume.

Further information on this principle can be found in the CIRIA document Designing for Exceedance in Urban Drainage – Good Practice.

National Standards for Management of Flood Risk

Flood risk within the development

S9 The design of the site must ensure that, so far as is reasonably practicable, flows resulting from rainfall in excess of a 100 Year Rainstorm event are managed in exceedance routes that minimise the risks to people and property.

Exceedance Flows

Exceedance flows, originating from both within and outside of the development site, should be directed through areas where the risks to both people and property are minimised.

When considering exceedance routes, particular attention should be paid to:

- i. The position of walls, bunds and other obstructions that may direct water but must not cause ponding
- ii. The location and form of buildings (e.g. terraces and linked detached properties) that must not impede flows or cause ponding

Submitted drawings and calculations must identify sources of water entering a site pre development, how flows will be routed through a site, where flows leave the site pre development and where they leave the site post development.

Emergency Overflows

An emergency overflow shall be provided for piped and storage features above the predicted water level in a 1 in 100 year storm including climate change. On small networks this may be a strategically located leaking manhole cover. On earth bunds or pond / basin spillways, a hard feature is required as shown in Figure 8.8. The spill route needs to be clearly defined.

Freeboard

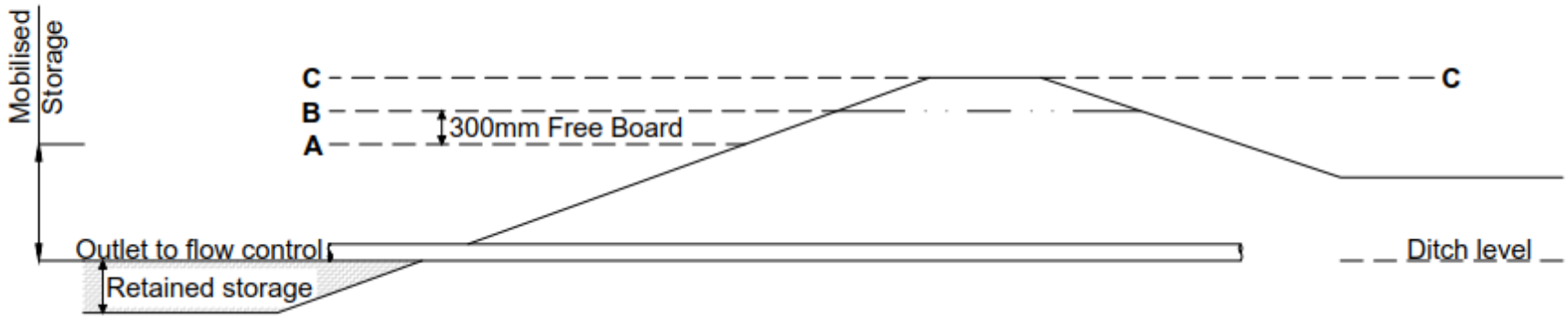
All surface water attenuation ponds or basins shall be designed with a 300mm freeboard above the predicted water level arising from a 100 year storm including climate change (Design scenario). Freeboard is defined as the distance between the design water level and the emergency overflow level.

For small ponds or basins this may be reduced if the risk to people and property have been evaluated. If the difference between the 100 year Design scenario level and 100 year Test level is less than 100mm, then the freeboard may be reduced to 200mm.

Where bunds are used, the bund will need to be designed to store water at the 100 year storm + Climate Change + Freeboard level. The embanked level will be even higher up, (typically 150mm to 200mm) refer to Figure 8.8. Groundwater levels need to be determined by site survey.

Overflow on Earth Bund

A - 100 Year + Climate change flood level.
B - Overflow level.
C - Final design level of bund allowing for settlement.



Overflow on Drainage Basin or Pond

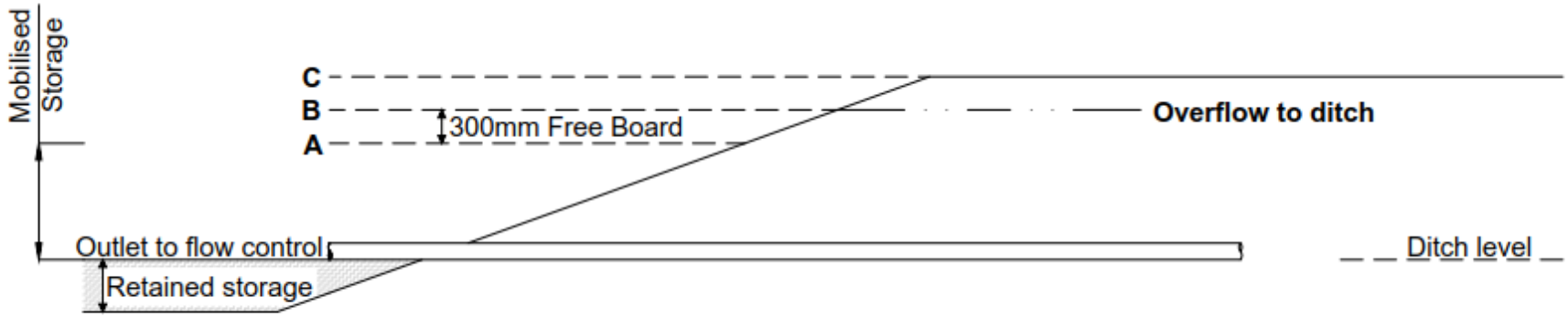


Figure 8.8

8.9 Structural integrity and new drainage connections

Below ground SuDS components should be as specified in Sewers for Adoption 7th Edition (Water Industry standards).

National Standards for Structural Integrity and Construction

Structural integrity

S10 Components must be designed to ensure structural integrity of the drainage system and any adjacent structures or infrastructure under anticipated loading conditions over the design life of the development taking into account the requirement for reasonable levels of maintenance.

S11 The materials, including products, components, fittings or naturally occurring materials, which are specified by the designer must be of a suitable nature and quality for their intended use.

Construction

S13 The mode of construction of any communication with an existing sewer or drainage system must be such that the making of the communication would not be prejudicial to the structural integrity and functionality of the sewerage or drainage system.

S14 Damage to the drainage system resulting from associated construction activities must be minimised and must be rectified before the drainage system is considered to be completed.

8.10 Climate Change

It is predicted that climate change is likely to increase the risk of more intense rainfall in the future and therefore all SuDS schemes must be designed to accommodate this.

Guidance from the Environment Agency (February 2016) identifies two possible scenarios for future increases in rainfall intensity, 'Central' and 'Upper End' (Table 8-10). These projected increases relate to the anticipated lifetime of the development.

Table 8.10 Anticipated Increases in Rainfall Intensity as a Result of Climate Change

	Total Potential Anticipated Change Over Time Frame		
Scenario	**2015 - 2039**	**2040 - 2069**	**2070 - 2115**
Upper End	10%	20%	40%
Central	5%	10%	20%

The developer should review the expected design life of the development in order to complete this assessment. Typically the design life for a commercial development is less than for a residential development. The 2060-2115 scenario will be used unless the developer demonstrates that a shorter design life is appropriate.

The 'Central' scenario should be used for Design purposes. For Residential developments located within Herefordshire, the 100 year storm event plus a 20% allowance for climate change should be considered. Conversely a 10% allowance applies for Commercial Property.

Developments should also be Tested using the 'Upper End' scenario to enable the performance of the system and any residual risk of flooding to be understood and managed adequately.

Internal property flooding is not permitted, but retaining water in lowly vulnerable areas is acceptable. Where attenuation sites are proposed, it may be possible to reduce the freeboard on the basis that the Test scenario would be exceptionally rare. For Residential developments located within Herefordshire, the 100 year storm event plus a 40% allowance for climate change should be considered. Conversely 20% allowance applies for Commercial Property.

For sensitive sites that are high density and that are adjacent to or upstream of areas at risk of fluvial or surface water flooding identified in the Strategic Flood Risk Assessment, Herefordshire Council will require a full demonstration that the Upper End Test Scenario for climate change has been applied to the design. Some surface features may need raising to retain floodwater.

Agricultural sites such as Polytunnels should be designed assuming a 50 year design life.

The percentage increases in rainfall intensity defined in Table 8.10 are used to factor the rainfall rates that are used in the design calculations. It is necessary to re-run any MicroDrainage simulations using the factored rainfall rate to establish the impact of Climate Change. **Predicting the impact by applying a factor to the results of a base-line simulation is not acceptable as this will not identify the impact of Climate Change.**

Local Standard F – Climate Change

The LLFA will expect SuDS design to include an allowance for an increase in rainfall for a 100 year rainstorm event determined based on the design life of the development in order to accommodate climate change (see Table 8.10).

8.11 Urban Creep

Urban creep is the gradual loss of permeable surfaces within urban areas which results in increased surface water runoff. Typical examples of urban creep include the creation of patios, the paving over of front gardens to generate space for parking or small scale house extensions. Householders hold permitted development rights that allow such development to proceed without submitting a planning application.

To ensure that SuDS schemes can cope with future demand, an allowance for urban creep must be made in the design calculations. The table below sets out the factors that should be applied to the impermeable areas of a development to account for urban creep.

Table 8.11 Urban Creep Allowance

Residential Development Density (dwellings / ha)	Change Allowance (% of impermeable area)
<= 25	10
30	8
35	6
45	4
>=50	2
Flats and Apartments	0

Local Standard G – Urban Creep

For all residential housing estates of 10 houses or more, the SuDS design shall include an allowance for an increase in impermeable area to accommodate urban creep (Table 8.11).

8.12 Soakaways

Soakaways should be designed so that half the drain time occurs in less than 24hours.

Soakaway bases are to be a minimum of 1m above the highest recorded groundwater table. Where groundwater fluctuations are anticipated, structures should be lined to prevent ingress of groundwater. At sites where groundwater levels are above this level, but there is a Low Receptor Risk rating and a highly permeable soil layer exists, a drainage solution utilising soakaways may be possible.

Consideration should always be given to varying vertical geology as it might be that more permeable soils are present beneath shallow impermeable layers, hence infiltration of surface water may still be possible using deeper drainage systems. Similarly, care must be taken to confirm infiltration at the depth of the proposed drainage features as higher permeability soils could overlay geology of limited permeability.

A cautious approach should be taken when interpreting permeability results from soakaway tests. The SuDS Manual (Table 4.8) identifies factors of safety to facilitate soakaway design.

Soakaways installed at private properties must be located within the curtilage of the respective properties and should not be shared between neighbouring plots.

The use of a joint soakaway will only be permitted if a Private Management Company is set up to manage land that is held in joint ownership (of all land owners that are served by the SuDS scheme).

Point-source soakaways are not to be installed with 5m of building foundations.

The presence of a soakaway below or immediately adjacent to a carriageway will prevent future adoption of the highway under Section 38. Soakaways are not permitted below carriageways serving 6 or more houses.

Soakaways presented for Section 38 adoption by Herefordshire Highways may be installed on private land bordering adopted highway, if a wayleave agreement is implemented. In this case the soakaways and any distribution pipes would need to be located in areas considered unsuitable for build overs e.g. front gardens (refer to Figure 8.12). Lockable covers may be required and manhole cover segments should be bolted together.

Offset distances for Linear Soakaways, or Point Source Soakaways built on land alongside highways offered for Section 38 adoption are also shown in Figure 8.12. Where the land is higher than the highway, due consideration should be made for the risk of groundwater affecting the road sub-structure.

The Building Regulations includes design guidance which states that soakaways should be designed for a 1 in 10 year rainstorm. The Design Manual for Roads & Bridges also utilises this criteria. However Sewers for Adoption (7th Edition) calls for no flooding from surface water

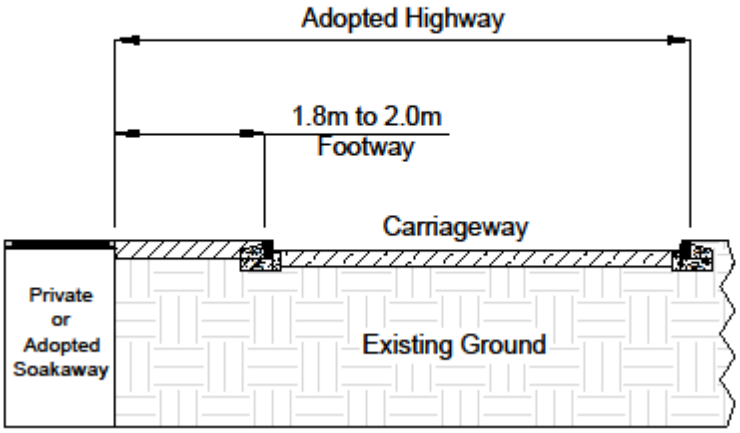
sewers during a 1 in 30 year rainstorm. Accordingly the applicant needs to present a drainage design that demonstrates sufficient capacity within the network to accommodate incoming flow from a 1 in 30 year rainstorm. This may be achieved by designing the soakaway for a 10 year storm and relying on additional storage in the pipe network, up to the soakaway cover level. In some cases this will involve installing larger soakaways than may be required to satisfy BRE or DRMB guidance.

As outlined above in Section 8.10 allowance needs to be made for climate change

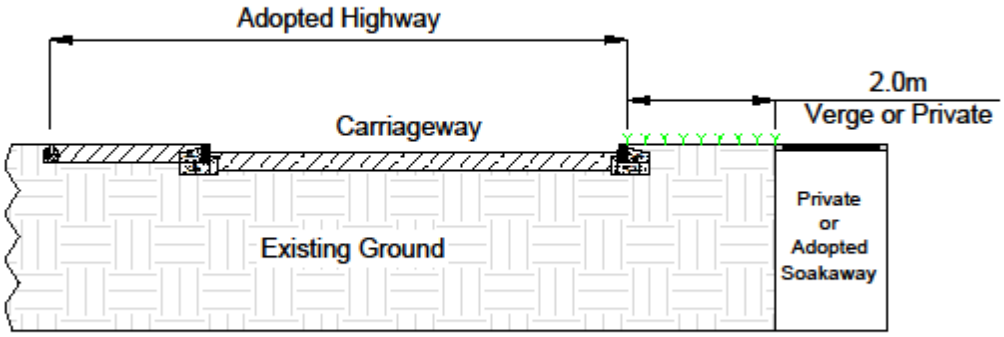
To demonstrate compliance with National Standard S4, some developers seek to utilise large soakaways to retain rainwater on site for a 100 year storm. Whilst we support this approach, we encourage developers to identify any surface features within the site that would store water. CAD Civil 3D calculations and topographical surveys may be presented to demonstrate the extent (volume) of any surface storage.

When soil conditions have low infiltration rates, the Council still promotes the use of unlined storage and conveyance features that promote infiltration during low rainfall events. This is because SuDS in areas of limited permeability will still reduce flow rates and volume during small rainfall events. When considering the use of SuDS on a development, low infiltration rates will not be accepted as a valid reason for the not using of SuDS. Low infiltration rates merely influence the choice of SuDS. Infiltration based SuDS are unlikely to be suitable for clay soils, however SuDS which store or convey water such as swales, ponds and wetlands can be used. The risk of ground instability or subsidence needs to be considered. On sloped sites if there is an impermeable layer below the soil that surrounds the proposed soakaways, then there is a risk of water quickly soaking to lower ground, causing soakaways to be less effective and also creating slope stability risks.

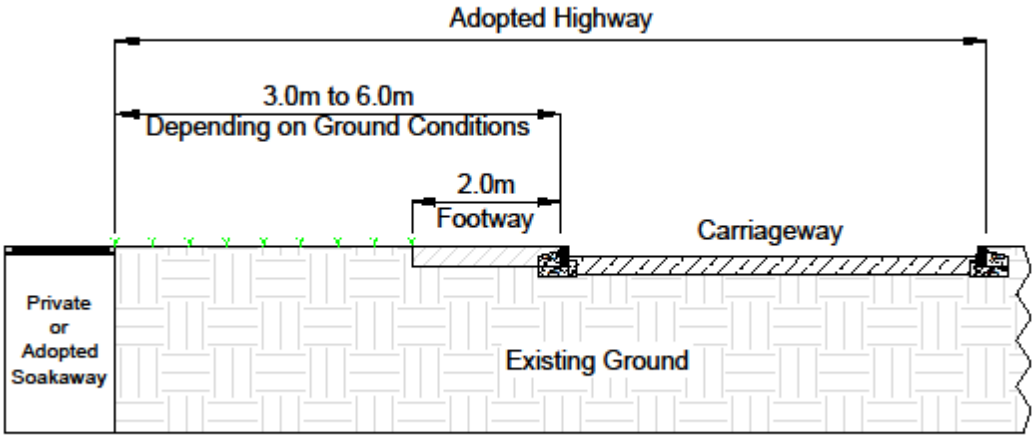
Unclassified Roads (Serving Estates)



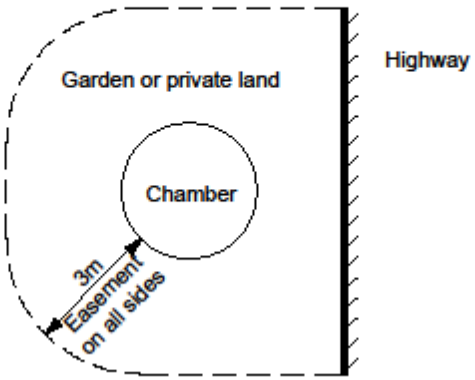
Unclassified Roads (Serving Estates)



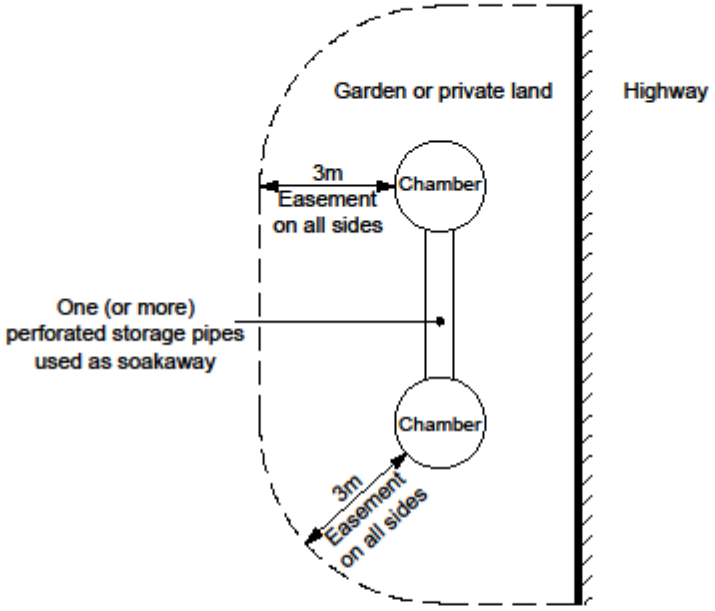
A, B & C Class Roads



Easements for Section 38 Soakaways Built on Private Land



Concrete Soakaway Ring
(With or Without Distribution Pipes)



Large Perforated Pipe and Concrete Soakaway Ring
(With or Without Distribution Pipes)

- Distribution pipes may be laid within easement. (away from highway).
- Invert of perforated pipes are to be installed min 450mm above chamber base.

Figure 8.12 – Soakaways adjacent to highways

8.13 Permeable Paving

Developers are required to provide a specification for permeable paving. As outlined below the detail will differ according to the soil permeability and site gradient.

Herefordshire Council do not currently adopt Permeable Paving under Section 38.

Developers need to consider a maintenance strategy for Permeable Paving and incorporate this within the Maintenance Plan. The strategy needs to identify how the future site owners will be made aware of the importance of cleansing the permeable paving and identify a cleansing method. At commercial developments the Maintenance Plan shall include proposals to cleanse permeable paving using jetting plant, on a five yearly cycle.

Where built in areas with significant gradients, Permeable Pavements need to incorporate check bunds with throttles to manage flows and make maximum use of storage. In addition, as the bases of pavements are usually built to be horizontal, there is a terracing effect.

Hydraulic outlets from Permeable Pavements can be throttled using orifice plates. Orifices can be as small as 25mm or even smaller, as blockage protection is implicitly provided by the nature of the structure.

The percolation of water through the sub-base significantly attenuates runoff rates for ordinary rainfall events. A large proportion of the runoff volume is removed through infiltration to ground, even in clay locations if the pavement is not lined. This volume loss is not assumed when calculating the volumes of storage requirements for managing extreme events. Permeable Pavements are assumed to provide two levels of treatment; one level through percolation through the bedding and stone media, and also infiltration through the unsaturated ground below.

Permeable Pavements are to be designed to consider provision of corridors and crossings for utilities.

Builders and developers are encouraged to ensure that Permeable Paving is installed at the end of construction projects. This measure is considered good practice because pores can become blocked with mud and construction dust.

8.14 Designing to facilitate Maintenance

Design should minimise maintenance requirements and health and safety should be appropriately managed as part of the design process. The Construction Design and Management (CDM) Regulations require all designers to identify, eliminate or control foreseeable risks that could arise at any time during the lifetime of a scheme because of its design. Therefore, the design process must include consideration of how the SuDS scheme in its entirety is to be maintained.

Local Standard H - Maintenance Requirements

The LLFA will expect SuDS to be designed so that they are easy to maintain. Proper use of the SuDS management train, including surface features and upstream treatment, can reduce the maintenance burden.

At Outline stage, the developer must set out who will the system, and how the maintenance will be funded.

At Discharge of Conditions, a Maintenance Plan is required. The plan is to be presented to the future landowner during the conveyancing process.

For a small site the Maintenance Plan could be contained on a few drawings.

Where SuDS assets are to be maintained by a Management Company, a more extensive Maintenance Plan is required. Maintenance responsibilities for the respective components of the SuDS system need to be shown. A maintenance schedule should be included. The process for levying fees and the issuing of interim payment certificates needs to be defined.

Developments shall include for the provision of maintenance access to and alongside drainage features that are not readily accessible from the public highway, including vehicular access as necessary.

An example Maintenance Plan is included in Table B.25 of Appendix B of the CIRIA SuDS Manual. Section 3.7 includes requirements on funding SuDS maintenance.

Developers need to consider a maintenance strategy for permeable paving and incorporate this within the Maintenance Plan. The strategy needs to identify how the future site owners will be made aware of the importance of cleansing the permeable paving and identify a cleansing method. At commercial developments the Maintenance Plan shall include proposals to cleanse permeable paving using jetting plant, on a five yearly cycle.

Oil interceptors shall be inspected at least every 6 months by experienced personnel. Proposals for cleansing of any below ground proprietary sediment separators (e.g. Downstream Defender) shall be defined.

Herefordshire Highways encourage applicants to consider how safe cleansing of highway drains will be performed. This issue is particularly significant where Kerb Drainage Systems (e.g. Beany Blocks) feature on lengths of highway presented for S38 adoption.

8.15 Maintenance of grassed slopes

The vegetated side slopes of SuDS features should not exceed a gradient of 1:3 in order to avoid soil slippage, the resultant non-establishment of vegetation, for health and safety reasons and to ensure access for maintenance.

Guidance on maintenance requirements relating to slopes is available on the HSE's website. This indicates that where there is a risk of ride on mowers overturning, gradients should be limited to 1 in 6.

The SuDS Manual suggests that a sloped bank which is to be grassed may be built with a slope of 1 in 4. If the developer presents a design showing this detail then the Maintenance Plan will need to demonstrate how the slope will be maintained.

8.16 Pumping Stations

National Standards for Maintenance

Designing for maintenance considerations

S12 Pumping should only be used to facilitate drainage for those parts of the site where it is not reasonably practicable to drain water by gravity.

Use of Pumped Systems

If it can be demonstrated that a partial or completely pumped drainage system is the only viable option, the residual risk of flooding due to the failure of the pumps needs to be assessed. The projected flood level must be determined with the pumps switched off. Accordingly it is likely that a long duration winter storm will become the critical design storm. The LLFA will define the attenuation required on a case by case basis, but normally this shall be sized to accommodate at minimum, a 30 year design storm, with no flooding at the surface.

The volume of external flooding for a 100 year +CC storm shall then be calculated for the above scenario. CAD Civil 3D calculations and topographical surveys may be presented to demonstrate the extent (volume) of any surface storage. This should demonstrate that egress from properties is possible, with maximum flood depths on car parks and paths not exceeding 300mm

The finished floor levels of the affected properties should be raised a minimum of 300mm above this level and all flooding should be safely stored with no impact on adjacent property.

Discharge flow rates identified within design documentation shall be based on the peak flow rate whilst pumps are in operation, not the average flow rate determined from inflow into the wet well. To demonstrate compliance with the National Standard on Peak Flow, at some sites specialist pump control equipment may be required to pump water at equivalent Greenfield rates. Accordingly developers should be made aware of the need to raise a budget for the apparatus needed to pump low design flows. Kiosks and pump chambers should be shown on planning drawings. Designers are reminded to consider the projected level of floodwater (fluvial, surface water or local flood due to pump failure) and how this may affect the kiosk.

8.17 Storage Tanks and Tank Sewers

Herefordshire Council does not accept that surface attenuation features cannot be fitted into a development. From the onset of the planning process, the layout of the building plots should be developed making an allowance for such drainage features. The developer will need to demonstrate that reasonable consideration has been made to avoid the use of below ground tanks before they are approved.

Deep storage tanks or tank sewers should be presented for adoption by the Water Companies, as these organisations have a proven record in maintaining such structures. Shallow tank sewers may be adopted by Herefordshire Council under Section 38, subject to a review of their alignment (there would need to be a means to repair them). To facilitate cleansing, a line of sight is required through the tank from both ends.

Shallow control structures on steeply inclined tank sewers can be subjected to high hydrostatic pressures during rainstorms. Designers are reminded to consider the detrimental effects that leaking pipe joints can have on the adjacent road pavement.

Tank sewers are to be sized correctly to accommodate the respective design storm. They shall be installed at a moderate gradient to ensure that the hydrostatic pressure does not rise sharply during rainstorms. Tank Sewers shall be designed as water retaining structures.

In accordance with Sewers for Adoption (7th Edition), where parallel pipes are used for attenuation, one pipe should act as online storage, one as offline.

In compliance with the CDM Regulations, all parties hold a duty to develop the design of a tank or deep structure to minimise the risk associated with maintenance. The designer and client hold a legal liability to the future owner of the tank. Accordingly if a deep tank or structure is proposed then it should be designed to limit (or even eliminate) the need for confined space entries. The cleansing strategy should include an estimate of the cost of completing a confined space entry if required and this information is to be presented to the freeholder of the land and incorporated in the Health and Safety File of the development / building. The maintenance strategy will be subjected to scrutiny and if inadequate could be rejected by the Lead Local Flood Authority.