## Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disclaimer</td>
<td>2</td>
</tr>
<tr>
<td>Foreword</td>
<td>3</td>
</tr>
<tr>
<td>Introduction</td>
<td>4</td>
</tr>
<tr>
<td>Policy Context</td>
<td>7</td>
</tr>
<tr>
<td>Post-development run-off rates</td>
<td>11</td>
</tr>
<tr>
<td>Technical guidance - general</td>
<td>15</td>
</tr>
<tr>
<td>Technical guidance - landscape and amenity</td>
<td>20</td>
</tr>
<tr>
<td>Technical guidance - engineering</td>
<td>23</td>
</tr>
<tr>
<td>Technical guidance - biodiversity</td>
<td>27</td>
</tr>
<tr>
<td>Technical guidance - construction</td>
<td>30</td>
</tr>
<tr>
<td>Submission documents - complying with the standards</td>
<td>38</td>
</tr>
<tr>
<td>Adoption, management and maintenance</td>
<td>42</td>
</tr>
<tr>
<td>Appendix</td>
<td></td>
</tr>
<tr>
<td>Appendix 1: Glossary of terms and acronyms</td>
<td>46</td>
</tr>
<tr>
<td>Appendix 2: SuDS Types</td>
<td>51</td>
</tr>
<tr>
<td>Appendix 3: Case studies</td>
<td>52</td>
</tr>
<tr>
<td>Appendix 4: Rainfall - Runoff and stormwater storage estimation</td>
<td>53</td>
</tr>
<tr>
<td>Appendix 5: Useful Contacts</td>
<td>61</td>
</tr>
<tr>
<td>Appendix 6: SuDS Checklist</td>
<td>68</td>
</tr>
</tbody>
</table>
Disclaimer

This publication is not intended to provide legal advice. Whilst every effort has been made by Ashford Borough Council, the Environment Agency and our consultants to ensure its accuracy and completeness, no liability or responsibility of any kind (including liability for negligence) can be accepted by the authors or Ashford Borough Council to any person or entity for any loss or damage arising from its use.

Readers of this document are reminded that they are responsible for observing the regulatory and technical standards relative to their project and for the appropriate application of this document to such projects.
Foreword

Water is a defining part of Ashford's landscape: indeed the town owes its very existence to the rivers on which it is located. The 16th century writer Philpot believed that "Essetesford" – Ashford’s former name - stood for "ash trees growing near a ford", while Lampard, a 16th century local historian, suggested that it meant "a ford over the river Eshe or Eshet", which was the old name for the tributary of the River Stour which rises at Lenham. Over the centuries the town has been shaped by its relationship with its rivers. This relationship is as important now as it has always been; indeed it could be argued, that with the impact of climate change, this relationship is more important than ever.

Integrated water management is essential to Ashford’s response to the 2003 Sustainable Communities Plan. Tackling flooding, water supply and water quality is imperative for the housing and economic growth planned for the area. Equally, Ashford’s growth must not come at the expense of the town’s environment; instead, it must be a force for urban and rural environmental improvement.

It is widely recognised that Sustainable Drainage Systems (SuDS) are an important contributor to effective water management. Just as Ashford's rivers have shaped the town in the past, SuDS can play an important role in shaping the town of the future. Whilst primarily serving to manage flood risk, SuDS can help reduce pollution and maintain water resources – an important consideration for the town as it is located in one of the most arid parts of the country. Furthermore, well-designed SuDS can contribute to quality neighbourhoods, providing opportunities for wildlife to thrive, and enhancing the leisure, play and educational offer within our public open spaces.

This SPD provides guidance for developers on what is expected of them as they bring sites forward. It is essential that the management of water is considered at the earliest stage of a development. By integrating SuDS into site design the maximum benefits can be achieved, for people and the environment. The means of managing water should become an asset to the development and the wider community.

*Flume; design in town centre represents Ashford's close association with water. Source: RTPI*
1 Introduction

1.1 Ashford is set to double in size over a 30 year period to deliver 31,000 new homes and create 28,000 additional jobs by 2031. Delivering this level of growth will result in significant expansion of the current urban area and a commensurate increase in impermeable area and surface water run-off.

1.2 Ashford experiences flooding and the natural catchment has changed over the years to become more ‘peaky’ as surface water drains into the rivers and streams much quicker than it used to. To some extent this has been offset by the provision of upstream storage reservoirs at Hothfield and Aldington. Recent studies by the Environment Agency have identified that there is little scope for additional strategic flood risk management options – such as additional upstream storage - and that comprehensive provision of sustainable drainage systems will be required to manage surface water run-off.

1.3 The Council is committed to ensuring that Ashford’s future growth contributes to a reduction in flood risk. Policies CS 19 and CS 20 of the adopted Core Strategy will help reduce any negative impacts of new development on flood risk and seek to improve the situation if possible.

1.4 The latest UK Climate Projections (UKCP 2009) reaffirm that winters are likely to get wetter and that we are also likely to experience more extreme weather conditions such as intense rainfall events. Existing surface water drainage systems are not designed to cope with these extreme conditions. Extensive flooding in the UK in the summer of 2007 was mostly due to surface water overwhelming traditional piped surface water drainage systems.

1.5 The increased prevalence of impermeable surfacing means that less water permeates into the ground thus reducing the amount of water available for abstraction for public water supply. Ashford is already ‘water stressed’.

1.6 Growth in Ashford, along with the effects of climate change, will require an innovative approach to the way we plan new communities. This guidance is designed to aid all those involved in the planning, design and construction of new developments within the Ashford Borough. This document sets out the specific detail and information required by the Council to determine the suitability of a development proposal in respect of surface water management.

Purpose

1.7 The main purpose of this SPD is to provide guidance on the measures and opportunities available to planners and developers to integrate sustainable drainage into their development. Although this document specifically provides guidance for those developments required to comply with Policy CS 20, the principles contained within this guidance are applicable to all new developments.
1.8 The Ashford Local Development Framework Core Strategy was adopted in July 2008, and sets the strategic vision for development in the Borough between 2006 and 2021. A central part of this vision is to deliver high-quality, sustainable places, and a number of policies have been adopted to help deliver this aim. While sustainability covers an array of aspects such as the environment, economy and social issues, this SPD has been drafted to help applicants respond positively to the following Core Strategy policies:-

CS1 Guiding Principles  
CS8 Infrastructure Contributions  
CS10 Sustainable Design and Construction  
CS11 Biodiversity and Geological Conservation  
CS18a Strategic Recreational Open Spaces  
CS19 Development and Flood Risk  
CS20 Sustainable Drainage  

1.9 Of the above Core Strategy policies, CS 20 is obviously of most relevance to this SPD and is reproduced in full here:-

POLICY CS20: Sustainable Drainage

All development should include appropriate sustainable drainage systems (SUDS) for the disposal of surface water, in order to avoid any increase in flood risk or adverse impact on water quality.

For greenfield developments in that part of the Ashford Growth Area that drains to the River Stour, SUDS features shall be required so as to achieve a reduction in the pre-development runoff rate. On all other sites in the Borough, including those in the south-western part of the Growth Area that drains to the River Beult, developments should aim to achieve a reduction from the existing runoff rate but must at least, result in no net additional increase in runoff rates.

SUDS features should normally be provided on-site. In the Ashford Growth Area if this cannot be achieved, then more strategic forms of SUDS may be appropriate. In such circumstances, developers will need to contribute towards the costs of provision via Section 106 Agreements or the strategic tariff. In all cases, applicants will need to demonstrate that acceptable management arrangements are funded and in place so that these areas are well maintained in future.

SUDS should be sensitively designed and located to promote improved bio-diversity, an enhanced landscape and good quality spaces that improve public amenities in the area.

1.10 When adopted, this SPD will form part of the Ashford Local Development Framework (LDF).

1.11 The key objectives for this SPD are set out below:
• To ensure all new developments are designed to reduce the risk of flooding, and maximise environmental gain, such as: water quality, water resources, biodiversity, landscape and recreational open space.

• To ensure that all new developments are designed to mitigate and adapt to the effects of climate change.

• To provide guidance to developers on what will be expected to deliver the Core Strategy CS 20 standards, and the information that is required to be submitted with applications.

**1.12** In this context SuDS involve a move from traditional piped drainage systems to engineering solutions that imitate natural drainage processes. SuDS are considered more sustainable than conventional drainage approaches as they:

• Lower runoff flow rates, reducing the impact of urbanisation on flooding;

• Protect or enhance water quality;

• Are sympathetic to the environmental setting and the needs of the local community;

• Provide a habitat for wildlife in urban watercourses; and

• Encourage natural groundwater recharge (where appropriate).

**1.13** Ashford Borough Council has signed the Nottingham Declaration on Climate Change which is a public commitment to develop plans to progressively address the causes and impacts of climate change. Building more sustainable homes is also a key objective of the Ashford Sustainable Community Strategy, which sets out a shared long-term vision for the Ashford Borough that reflects local aspirations.
2 Policy Context

2.1 Sustainable drainage is increasingly recognised as an important consideration in national, regional and local planning as an effective means to manage surface water flooding.

National Policy Guidance

2.2 Planning Policy Statement 1 (PPS1) sets out the Government's overarching planning policies on the delivery of sustainable development through the planning system. Key objectives include ensuring that developments are sustainable, durable and adaptable and make efficient use of resources. Tackling the causes and predicted effects of climate change within the planning system has received significant attention by the Government which has published a supplement to PPS1 on 'Planning and Climate Change' (2007). PPS 1 sets out a number of key objectives for the planning system in respect of climate change.

2.3 Planning Policy Statement 9 (PPS9) sets out the Government's planning policies on protection of biodiversity and geological conservation through the planning system. PPS9 states that local planning authorities should ensure that appropriate weight is attached to designated sites of international, national and local importance; protected species; and to biodiversity and geological interests within the wider environment.

2.4 Planning Policy Statement 25 (PPS25) sets out the Government's planning policies on development and flood risk, and is the foundation on which this SPD is based. PPS25 states that flood risk should be taken into account at all stages in the planning process. Specifically local planning authorities should prepare and implement planning strategies that help to deliver sustainable development by appraising risk, managing risk and reducing risk. PPS25 has key planning objectives to reduce risk to and from new development by incorporating sustainable drainage systems (SuDS); using opportunities offered by new development to reduce the causes and impact of flooding through surface water management plans; making the best use of green infrastructure for flood storage, conveyance and SuDS.

2.5 In Making Space for Water (July 2004), the Government set out a more holistic approach to managing flood and coastal erosion risks in England. The approach involves taking account of all sources of flooding, embedding flood and coastal risk management across a range of Government policies, and stresses Government’s support for the concept of integrated management of urban drainage.

2.6 The Flood and Water Act 2010 encourages the uptake of sustainable drainage systems by removing the automatic right to connect to sewers and providing for unitary and county councils to adopt SUDS for new developments and redevelopments. The Act requires developers to include
sustainable drainage, where practicable, in new developments, built to standards which reduce flood damage and improve water quality. It also amends section 106 of the Water Industry Act 1991 to make the right to connect surface water run-off to public sewers conditional on meeting the new standards. It gives responsibility for approving sustainable drainage systems in new development, and adopting and maintaining them where they affect more than one property, to a SuDS approving body, generally local authorities.

2.7 In February 2008, the UK Government consulted stakeholders on ‘Improving Surface Water Drainage’. This included questions on how to increase uptake of SuDS as the preferred option instead of connecting surface water rainfall runoff to sewers. It also reviewed the right of new developments to connect surface water flows to the public sewerage system, which is seen as a barrier to the use of SuDS. Subsequently, Sir Michael Pitt’s Review put forward a number of recommendations which included action by the Government to determine which organisation should own and maintain SuDS. This issue is covered in Section 5.

2.8 The Building Regulations part H, Drainage and waste disposal, establishes a hierarchy for surface water disposal, which encourages a SuDS approach. The first option for surface water disposal should be the use of SuDS which encourage infiltration such as soakaways or infiltration trenches, followed by discharge to a watercourse and finally discharge to a sewer. This final option should only be considered where other forms are not practicable. In all cases, it must be established that these options are feasible, can be adopted and properly maintained and would not lead to any other environmental problems. For example, using soakaways or other infiltration methods on contaminated land carries groundwater pollution risks and may not work in areas with a high water table. Where the intention is to dispose to soakaway, these should be shown to work through an appropriate assessment carried out under Building Research Establishment (BRE) Digest 365.

2.9 The Code for Sustainable Homes was launched in December 2006 and sets a national standard for the sustainable design and construction of new homes. Attenuation of surface water through SuDS is included in the guidance. If SuDS are provided to attenuate runoff from both hard surfaces and roofs, 1 point can be awarded towards the overall sustainability rating. Additionally, it is mandatory for all levels of the code that run-off rates and annual volumes of run-off post development will be no greater than the previous conditions for the site.
Regional Planning Policy (South East Plan)

2.10 The South East Plan was adopted in May 2009 and will be the Regional Spatial Strategy for the South East covering the period to 2026. The Plan is a key tool to achieve more sustainable development, helping to protect the environment and combat climate change. The Adopted South East Plan (May 2009) includes a number of policies that cover a wide spectrum of sustainability issues; policy NRM3 covers sustainable flood risk management.

Local Guidance

2.11 Kent Design seeks to provide a starting point for good design while retaining scope for creative, individual approaches to different buildings and different areas. It aims to assist designers and others achieve high standards of design and construction by promoting a common approach to the main principles which underlie Local Planning Authorities’ criteria for assessing planning applications. Appendix C2 includes advice, guidance and information about design and implementation of drainage systems, including sustainable drainage solutions, for residential and industrial development.

2.12 In 2007, the Catchment Flood Management Plan (CFMP) for the River Stour was completed. This recommended flood risk management policies for various reaches of the River Stour over the next 50 years. For Ashford the CFMP recommended taking further action to sustain the current scale of flood risk into the future (responding to the potential increases in flood risk from urban development, land use change and climate change).

2.13 In August 2005, the Ashford Integrated Water Management Study (AIWMS) was published. The AIWMS assesses the constraints to growth that might arise in relation to meeting the demand for potable water; the provision of wastewater services and the impact of treated effluent on the receiving waters; and the management of flood risk. A key finding of the study was that post-development run-off rates would need to be over-attenuated. It suggests physical measures to manage flood risk resulting from the development of Ashford; identifying large-scale incorporation of SuDS throughout new development areas as the most effective flood risk management option.

2.14 Water for Ashford – the 2007 summary of the Ashford Water Cycle Strategy (2006 – 2031) – translates the recommendations of the AIWMS into policies and states: ‘From 2006, all new sites in Ashford will need to reduce storm run-off to 4 litres per second per hectare on impermeable ground and 2 litres per second on permeable ground’.
2.15 Ashford’s **Strategic Flood Risk Assessment** (SFRA) was completed in October 2006 as a Core Strategy Background Document. It describes how drainage systems should be developed in line with the objectives of sustainable development by balancing the different issues that should be influencing the design. It recognises that surface water drainage methods that take account of quantity, quality and amenity issues are more sustainable than conventional drainage methods because they:

- Manage runoff flow rates, reducing the impact of urbanisation on flooding;
- Protect or enhance water quality;
- Are sympathetic to the environmental setting and the needs of the local community;
- Provide a habitat for wildlife in urban watercourses; and
- Encourage natural groundwater recharge (where appropriate).

2.16 The **Ashford Sustainable Drainage Study – Technical Guidance Document** - was completed in March 2008 by Atkins. This document forms the basis of the technical sections of this SPD and the SuDS examples in the appendices to this SPD.
3 Post-development run-off rates

3.1 The Core Strategy (at paras. 15.13 – 15.18) sets out the main aims for surface water run-off in different parts of the Borough. These are largely drawn from the Ashford Integrated Water Management Study (AIWMS). For ease of reference, the main aspects of these paragraphs are repeated below.

3.2 Rainfall on undeveloped greenfield areas either evaporates, is absorbed by plants, or drains naturally into streams and rivers over a period of time by infiltrating into the ground or running overland. New areas of built development are typically formed of impermeable surfaces such as roofs and roads. No water is intercepted by plants and trees, nor is it able to infiltrate into the ground. This can exacerbate the flood risk. Developed areas need to be drained to remove this incident rainfall. Urban drainage has traditionally sought to move water quickly from land to the river system. This typically means surface water arrives in our rivers and streams faster and in greater quantity – often resulting in increased flood risk.

3.3 SuDS are the primary means by which this increase in run-off should be mitigated. They can manage runoff flow rates to reduce the impact of urbanisation on flooding, protect or enhance water quality and provide a multi-functional use of land to deliver biodiversity, landscape and public amenity aspirations, and support Ashford’s proposed network of green spaces and water bodies. They do this by dealing with runoff and pollution close to its source and protect water resources from point pollution. They may also allow new development in areas where existing drainage systems are close to full capacity, thereby enabling development within existing urban areas.

3.4 It is therefore important that all new developments should provide appropriate SuDS for the disposal of surface water rainwater so that it is retained either on-site or within the immediate area, or by other water retention and flood storage measures. SuDS should seek to deal with surface water runoff locally, returning the water to the natural drainage system as near to the source as possible. This approach is commonly known as the ‘surface water management train’ or ‘source-to-stream’.

3.5 Government planning guidance highlights the aims for greenfield and brownfield applications of SuDS in PPS1 and PPS25. The latter (at Annex F10) establishes the key principles in relation to run-off from developments on greenfield and previously developed land that inform the policy guidance below.

3.6 It is common practice to restrict surface water run-off from developed areas to the equivalent greenfield run-off rate. Furthermore, in the Ashford Growth Area, the Ashford Integrated Water Management Study (AIWMS) has identified an approach and evidence base for the use of sustainable drainage and has set out respective target run-off rates for greenfield developments in different parts of the Growth Area. These are reflected in this SPD.
3.7 Therefore, in accordance with policy CS20, all greenfield developments in the Ashford Growth Area, other than those in the south-western part of the Growth Area that are not within the Stour catchment, will be required, through appropriate SuDS features, to achieve a net reduction in surface water run-off below the previous greenfield run-off rate to meet the relevant standards specified in the AIWMS.

3.8 The AIWMS identifies the M20 as the boundary between different policy requirements for run-off rates. This is because the M20 closely follows the change in geological conditions, with increased infiltration possibilities to the north. This distinction reflects the greater prevalence of the less permeable clay-based soil types found south of the motorway which results in greater natural run-off rates from greenfield locations. This distinction is followed through into the run-off rate standards in Table 3.2 below.

3.9 For all other Greenfield sites in the Borough, including those in the Growth Area that drain to the river Beult catchment, developments will be encouraged to meet the 4 l/s/ha AIWMS greenfield run-off standards for the Stour catchment (south of M20) as far as is possible but as a minimum, will be required to avoid any net increase in run-off rates. This should not normally exceed a rate of 6 l/s/ha based on the local standard set out in Table A2 in Appendix 4 to this SPD.

3.10 For brownfield developments in the Borough, the existing run-off rate may need to be calculated through a network analysis of the surface water drainage system. However, where this is not possible, a proxy rate may be calculated using the equation in paragraph A4.11 of Appendix 4 to this SPD. This should be based on an average 2 year return rainfall event of 6 hours duration, which equates to a run-off rate standard of 11.4 l/s/ha.

3.11 It is recognised that different rainfall events have different impacts. At a site level it is usually the short duration, very intense rainfall event that causes drainage systems to be overwhelmed. Whereas at a river catchment level it is usually the prolonged, less intense rainfall event that will cause river systems to flood. In Ashford, the wide scale usage of SuDS is required to reduce the risk of flooding at a river catchment scale, whilst at the same time protecting the site from short duration, intense rainfall events. As such, SuDS design will be, by necessity, a compromise. For Ashford, the catchment characteristics suggest a six hour rainfall event is appropriate for design purposes. A consequence of this is that surface water storage volumes are likely to be higher than would be necessary to purely protect the site. This should be allowed for in site layouts and design.
Table 3.1 Site and catchment scale likely ‘worse-case’ rainfall events

3.12 It is possible some larger sites may lie on the watershed between two catchments – for example, Chilmington Green lies on the watershed between the Stour and the Beult. In such instances the general assumption is that surface water will continue to drain to the same catchment pre and post development.

3.13 Table 3.2 below sets out the run-off rate standards that will be applied in different parts of the Borough on either Greenfield or previously developed sites.

<table>
<thead>
<tr>
<th>Area</th>
<th>Type</th>
<th>Acceptable run-off rate (litres/second/hectare)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growth Area - north of M20</td>
<td>Greenfield</td>
<td>2 l/s/ha</td>
</tr>
<tr>
<td>Growth Area - north of M20</td>
<td>Brownfield</td>
<td>‘Best endeavours’ to achieve 2 l/s/ha; failing that, aim to achieve a reduction from the existing run-off rate; as an absolute minimum must not lead to net increase in run-off rate. (Nominally 11.4 l/s/ha)</td>
</tr>
<tr>
<td>Growth Area - south of M20, including urban extension areas at Cheeseman’s Green and Chilmington Green (east)</td>
<td>Greenfield (Stour catchment)</td>
<td>4 l/s/ha</td>
</tr>
<tr>
<td>Growth Area - south of M20, including Chilmington Green (west)</td>
<td>Greenfield (Beult catchment)</td>
<td>Encouraged to achieve 4 l/s/ha but must avoid any run-off rate in excess of 6 l/s/ha</td>
</tr>
<tr>
<td>Growth Area - south of M20, including town centre regeneration sites</td>
<td>Brownfield</td>
<td>‘Best endeavours’ to achieve 4 l/s/ha; failing that, aim to achieve a reduction from the existing run-off rate; as an absolute minimum must not lead to net increase in run-off rate. (Nominally 11.4 l/s/ha)</td>
</tr>
</tbody>
</table>
Policy CS20 recognises that on some sites, such as brownfield or small-scale infill developments, development in Conservation Areas, or small-scale development of constrained sites, it may not be possible to restrict run-off to the required rate. Where the applicant has identified this is the case they will need to submit a sound and fully justified case for why the policy requirement cannot be met. This is the ‘best-endeavours’ approach referred to in Table 3.2.

The Council will expect clear evidence and justification to be presented on why a development cannot achieve consistency with policy CS20 through meeting the run-off rate standards set out in Table 3.2. This should include a detailed technical appraisal, open to clear inspection, demonstrating why lower run-off rates cannot be achieved for technical reasons.

Small sites present a particular challenge. If the standard run-off rate (4 l/s/Ha) is applied to small sites (< 0.25 Ha) it can result in a very small discharge which is difficult to design for. Flow control devices are generally available for discharges as low as 2 l/s. For this reason it is deemed applicable to apply a maximum discharge limit of 2 litres per second to all sites under 0.25 Ha. It is not acceptable to artificially sub-divide sites so that this de-minimus rate applies. Indeed, wherever possible it is preferable to combine sites and treat drainage strategically.
4 Technical guidance - general

4.1 The technical guidance sections aim to provide developers, project managers, designers and relevant regulators for Ashford with clear and practical advice on designing, operating and maintaining sustainable drainage systems. It addresses the key design and construction issues that need to be considered when looking to comply with Core Strategy policy CS20. Additional information is available from a variety of sources and these are referenced in the Appendices to this SPD. This document does not replicate detailed information and guidance referred to elsewhere; rather it seeks to set this within the Ashford context. SuDS design should be in accordance with National Standards, the CIRIA’s SuDS guidance, Kent Design and local guidance in this SPD.

4.2 The Flood and Water Act 2010 introduces National Standards governing the way in which surface water drainage systems must be constructed and operated. The Act introduces an approval system for the surface water drainage systems of the majority of new developments, including roads, in line with the National Standards.

4.3 SuDS should be used as an integrated approach to water management that contributes positively to the goals of sustainable development. Specifically, the objectives of SuDS design are to:

- Reduce downstream flooding by attenuating runoff; reducing peak run-off rate and run-off volume (if possible).
- Minimise the impact of development on water quality by using drainage systems that provide treatment benefits; and in combined sewer areas, reduce the incidence of combined sewer outfall storm discharges.
- Maximising benefits by applying the SuDS “management train”, comprising a series of SuDS from runoff source through to the point of discharge.
- Maximise integrated amenity, green space and biodiversity opportunities.
- Develop drainage designs that are sympathetic with the surrounding landscape character.
- Ensure appropriate long term ownership, management and maintenance arrangements are in place.

4.4 Successful SuDS design to achieve the SPD objectives requires the drainage to be carefully integrated into the site while taking into account the original greenfield drainage patterns. Integration is the most effective way to achieve the desired objectives of SuDS use. It is recommended that drainage requirements are given early consideration in the design process – on no account should they be ‘bolted-on’ to a pre-determined layout.
Management train

4.5 An efficient and integrated approach to SuDS requires the careful use of a range of techniques to be designed in a sequential order. The concept of managing storm water runoff from source to discharge and infiltration is referred to as the SuDS “management train”, shown in Figure 4.1. Each step of the management train changes the characteristics of run-off until it can be discharged.

![Figure 4.1 SuDS management train, Source: CIRIA 625](image)

SuDS Types

4.6 There are a large range of SuDS types available to allow developers to integrate the SuDS management train into their site layout. Table 4.1 summarises the main design guidance and criteria, opportunities and risks for SuDS in relation to engineering, landscape and biodiversity, in the Ashford context.

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Appropriateness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green roof</td>
<td>Source control</td>
<td>★★★★★</td>
</tr>
<tr>
<td>Water butt / rainwater harvesting systems</td>
<td>Source control</td>
<td>★★★★★</td>
</tr>
<tr>
<td>Soakaways</td>
<td>Infiltration</td>
<td>★★</td>
</tr>
<tr>
<td>Permeable paving</td>
<td>Infiltration / storage</td>
<td>★★★</td>
</tr>
<tr>
<td>Filter strip</td>
<td>Conveyance / infiltration</td>
<td>★★★</td>
</tr>
<tr>
<td>Swale</td>
<td>Conveyance / infiltration</td>
<td>★★★★★</td>
</tr>
<tr>
<td>Infiltration trenches</td>
<td>Infiltration / conveyance</td>
<td>★★</td>
</tr>
</tbody>
</table>
Table 4.1 Types of SuDS and their appropriateness in Ashford

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Appropriateness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open channels, Rills,</td>
<td>Conveyance</td>
<td>♦♦♦♦♦</td>
</tr>
<tr>
<td>Infiltration basin</td>
<td>Storage / infiltration</td>
<td>♦♦♦♦♦</td>
</tr>
<tr>
<td>Wet ponds (retention basins)</td>
<td>Storage</td>
<td>♦♦♦♦♦</td>
</tr>
<tr>
<td>Detention basins</td>
<td>Storage / infiltration</td>
<td>♦♦♦♦♦</td>
</tr>
<tr>
<td>Constructed wetland</td>
<td>Storage / infiltration</td>
<td>♦♦♦</td>
</tr>
<tr>
<td>Online / offline storage, including</td>
<td>Storage</td>
<td>♦</td>
</tr>
<tr>
<td>over-sized pipes, ‘milk-crate’ systems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Filtration techniques</td>
<td>Storage / infiltration</td>
<td>♦</td>
</tr>
</tbody>
</table>

4.7 When selecting the type(s) of SuDS to be used on a particular site, developers should consider the following:

- Run-off rate;
- Site topography and geology;
- Flow routes and space availability;
- Opportunities to enhance public open space, biodiversity, water quality and water resources; and
- Health and safety.

4.8 Within urban areas it may be possible to incorporate open channels or rills to convey water rather than using traditional underground pipes. In dense urban areas – where space is at a premium - these are an effective way of providing SuDS and can add interest as well as water quality and biodiversity improvements. This has already been used successfully in Ashford, for example West Street Water Garden. They can also be useful in contaminated sites as they can reduce the need for deep excavation.

4.9 In assessing SuDS, the Borough Council will consider not just the flood risk management criteria, but also the opportunities to realise other environmental gains and amenity uses. As such, underground storage, such as over-sized pipes or crates, will only be approved as a last resort if all other forms of SuDS have been demonstrated to be impractical. The exception to this would be if the underground storage were part of a rainwater harvesting scheme.
On-site and strategic SuDS

4.10 In accordance with policy CS20, developers will normally be expected to make provision for SuDS on site in order to achieve the appropriate run-off rate standard. Those SuDS techniques that can be used to control run-off close to the source and would be implemented within the development boundaries are termed on-site SuDS in this document. Such techniques would include infiltration systems, rainwater harvesting, filter strips, swales and green roofs. Small and medium sized ponds and wetlands could also be used.

4.11 Those SuDS techniques that are located lower downstream on the management train are termed strategic SuDS in this SPD. These strategic SuDS features would attenuate and treat runoff from larger catchment areas that was in excess of the on-site storage capacity. Strategic SuDS may in fact be located within a development area.

4.12 Where insufficient on-site SuDS provision cannot be achieved for developments in the Ashford Growth Area, developers will be required to make suitable in-lieu financial contributions through Section 106 Agreements or the proposed strategic tariff (subject to the details to be contained within the forthcoming Infrastructure Contributions SPD) to the provision, management and maintenance of strategic SuDS that provide a sustainable drainage solution for more than one site. The details, including the location of any such ‘strategic’ SuDS scheme, will be contained in site-specific DPDs.

4.13 It is likely that a combination of on-site and strategic SuDS will be required to achieve the required run-off targets. The amount of water that is required to be stored on-site will influence the type of on-site SuDS selected. The balance or ratio of water storage in each of these stages of the management train will change the likely SuDS to be selected and the land-take for SuDS.

4.14 In exceptional cases, SuDS may be provided ‘off-site’ but only provide storage for a single development site. These may also be acceptable if they can help the development achieve the appropriate run-off rate standard and would also need to be delivered via a Section 106 Agreement.

4.15 In all cases where a development scheme is relying in whole or in part on an ‘off-site’ SuDS to achieve the necessary run-off rate standard, then development may only be allowed to commence once the off-site SuDS has been completed even if a contribution towards its delivery has been agreed. Appropriate Grampian-style conditions will be attached to any grant of planning permission to ensure this is the case.
Source control

4.16 ABC requires that developers maximise run-off (source) control opportunities early in the management train. It requires that all residential developments incorporate rainwater harvesting features. These could be water butts for individual properties or incorporated into rainwater use systems for blocks of flats. Within commercial developments, buildings should incorporate the use of brown and/or green roofs to maximise treatment and habitat opportunities.

4.17 ABC requires developers to use swales and other “landscaped” features to collect and convey water as far as practicable. It discourages the use of piped systems and will not normally approve of schemes relying on these.

4.18 Across the Ashford area the Council is seeking to provide a range of habitats and SuDS features. Developers and their consultants should therefore approach ABC at an early stage to discuss appropriate solutions for their site.

4.19 Much of the Ashford Growth Area is underlain by impermeable clays, infiltration devices are not appropriate in these areas. Systems requiring infiltration may not be permitted in groundwater source protection zones (SPZs).

4.20 When sizing SuDS features, an allowance should be included for climate change, siltation and vegetation.
5 Technical guidance - landscape and amenity

5.1 It is recommended a landscape architect should be included in the design process from inception though to implementation to ensure that SuDS are designed as an integrated part of the site layout and landscape framework. This section gives an overview of the aspects that should be considered by designers at each phase of the design process.

5.2 At the scoping phase the landscape consultant should identify those key environmental issues on site and in the local area that need to be taken into consideration by the developer to ensure an integrated approach to designing SuDS. Examples could include heritage buildings, existing amenity space and the local Landscape Character Assessment. This is an ongoing activity during the life cycle of the development planning and design process and may need to be reactivated as new information comes to light as a result of consultation or available options are designed in more detail.

5.3 Examples of appropriate landscape and amenity design objectives and principles are as follows; SuDS should be designed to:

- Be a ‘seamless’ and integrated part of the site layout and landscape framework of open space and planting;
- Enhance the aesthetics of the open space;
- Embrace local distinctiveness, promote quality and protect existing features of cultural, and visual and historical importance;
- Be part of the open space of a development and assist the creation of an ‘Ashford Green and Blue grid’;
- Promote the movement of people - walking or cycling through open space;
- Enhance the amenity of open space - considering layout and profile, user interaction, finishes, and planting.
- Be easily accessible for maintenance, and
- Be safe.

5.4 The local landscape character and context of the proposed site must be respected in the design of all aspects of new development. The inclusion of landscape appraisal in the design process of SuDS will help to conserve and enhance the distinctive characteristics and quality of the landscape.
5.5 Landscape characterisation has increased in importance as a tool for countryside planning policy. Planning Policy Statement 7 promotes the character approach in order to offer more tailored guidance for the whole of the countryside. The Landscape Assessment of Kent provides a description of the landscape and a vision or strategy that directly reflects the condition and sensitivity of the area. Information can be downloaded from the Kent Landscape Information System Website (http://extranet7.kent.gov.uk/klis/home.htm).

5.6 This regional landscape assessment should be supplemented with information on the local landscape character and pressures of the site taking account of the combination of natural, man made and cultural features which includes an assessment of topography, scale, landscape features, movement and access, open space, colours, style, detailing of the surrounding area and links with the ‘Ashford Green and Blue grid’. This information will be included in the site appraisal which also includes the items identified in the Site Appraisal checklist (Source Kent Design Guide 2005/2006) and the identification of constraints and opportunities. The site appraisal identifying constraints and opportunities should be included in the development brief and submitted with the planning application and Environmental Statement. This approach should help to enrich the existing local landscape character whilst helping to integrate the development – reinforcing the positive design of the site.

5.7 Tree Surveys may indicate the presence of veteran trees - these should be identified, retained and managed in accordance with English Nature’s publication ‘Veteran Tree management’.

5.8 The site appraisal should feed into the design of SuDS within a development. In addition the environmental design objectives and principles can be used to help to define the environmental advantages and disadvantages of each option, which should include an assessment of the potential benefits of the SuDS to the amenity of the future development, the community and environment. These options should be presented to ABC, EA and Kent County Council (KCC) for their early consideration to determine the best solution for the site and local area.

5.9 The preferred SuDS should be included in the site masterplan which should show the preferred SuDS designed as ‘seamless’ and integrated part of the site layout and landscape framework of open space, habitat creation and planting. An Environmental Management Plan (EMP) that identifies the key environmental aspects of the site should also be produced. This should advise ABC as to how the developer intends to manage the SuDS as an integrated part of the site layout and landscape framework. The masterplan should be included in the development brief and submitted with the planning application and Environmental Statement.
5.10 The detail landscape design of the development should design the aesthetic layout of the SuDS - detailing layouts, profile, finishes and planting mixes, and sizes, The specification should include the EMP, planting and habitat creation e.g. translocation of species, local provenance, suppliers etc. This information should be submitted to ABC to discharge conditions, a SuDS management and monitoring plan should also be submitted.

5.11 ABC has a draft public works specification for New Work and Maintenance that developers need to conform to (November 2006).

5.12 It is expected that the provision of SuDS will be addressed in the Flood Risk Assessment (FRA) submitted in support of the planning application. In the absence of an FRA a specific drainage assessment will be required.

5.13 Whilst existing trees should be retained on site - site clearance should be specified in the contract documents if required. The timing of this activity should reflect seasonal constraints imposed by the bird nesting period normally mid February to end of September, and other species requirements e.g. reptile and dormouse. The ecologist will advise on timing and any method statement set out in any protected species licence application.

5.14 Existing topsoil and subsoil should be separated and stored on site according to BS 3882. The import of topsoil should be avoided unless agreed with ABC in advance of the works.

5.15 New planting and translocation of existing plants should be undertaken in the planting season – 31 October – 31 March. Planting should be supervised by an environmental clerk of works to ensure that the implementation of the planting and seeding reflects the specification and the design aspirations of the landscape framework.

5.16 Maintenance and management of habitats and planting should be included in the management plan which should reflect the environmental design objectives and principles identified at conception. Maintenance activities may include coppicing or pollarding of trees or clearance of sediment from ‘sacrificial’ ponds.
6 Technical guidance - engineering

6.1 Engineering considerations for SuDS are broad ranging, as for any drainage system. Conveyance and attenuation are primary considerations. To maximise the water quality treatment opportunities provided by SuDS, designers need to be cognisant of the characteristics of SuDS types and likely pollutant loads.

6.2 Examples of appropriate engineering design objectives and principles are as follows:

- Sufficient conveyance and attenuation to achieve runoff targets;
- Generally SuDS must not be located in the 1 in 100 year + climate change (20%) floodplain as shown on the Environment Agency’s website http://www.environment-agency.gov.uk/ or as set by a more detailed Flood Risk Assessment (FRA) of the site. However, some forms of source control techniques, such as green roofs, would be acceptable.
- Suitable discharge points of SuDS features into rivers, lakes or drainage ditches must be identified – or to existing public sewer.
- Site topography should be designed to ensure runoff can be captured by SuDS;
- Selection of SuDS suitable to site gradients to avoid erosion;
- Use of shallow sections and gradients to avoid erosion; and
- Design in liaison with ecologists to ensure vegetation is consistent with roughness assumptions etc. and selection of fast growing vegetation to minimise erosion during and immediately following construction.

6.3 Site specific infiltration tests should be carried out if devices relying on infiltration are proposed – note infiltration devices will not normally be permitted in any Source Protection Zones. Infiltration is unlikely in much of the Ashford Growth Area.

6.4 Designs should be mindful of desired water quality improvements. For example, wet ponds should be designed to avoid short circuiting and to achieve required residence times.

6.5 Oil interceptors may be required in commercial or industrial areas where runoff could be contaminated. Site specific guidance should be sought from ABC / Environment Agency.

6.6 If extended detention basins or other features are proposed as sports fields, ABC will require evidence of the frequency that these areas will be inundated. Detention basins should be designed to have a low level drainage channel that will be inundated more frequently than the full basin invert.
6.7 Provision should be made for raised cycle lanes and footpaths in or adjacent to linear SuDS features such as swales.

6.8 Inlets and outlets should be designed to avoid amphibians and other species becoming trapped.

6.9 Any feature storing more than 25,000m$^3$ of water above natural ground level will fall under the requirements of the Reservoirs Act 1975.

Health and safety

6.10 Health and safety issues are often raised as reasons for not implementing SuDS, particularly where wet ponds are located in residential areas or near playgrounds. With effective design, SuDS features can be made safe. The following examples demonstrate how health and safety issues can be managed:

- Designs should follow best practice, for example use of safety benches in wet pond features;
- Use of fences as safety barriers will not normally be approved. Designers should use barrier planting if necessary;
- Designs with shallow side slopes and barrier planting;
- Stagnant water can encourage mosquitoes;
- The Royal Society for the Prevention of Accidents (RoSPA, http://www.rospa.com/) provides safety advice and can audit designs;
- CDM regulations should be followed; and
- Health and safety risk assessment should be carried out on a site by site basis.

6.11 When specifying SuDS provision, CIRIA guide C697 should be followed and designs should be to the appropriate British or European Standard.

Construction

6.12 The protection of SuDS during construction is imperative. For example, permeable paving can easily become blocked by fine sediment eroding from unprotected surrounding areas. The designers should consider the construction sequence with care. See Section 8 for more detail.
Maintenance

6.13 Adoption and maintenance issues are addressed in Section 9. Regular and effective maintenance is essential to ensure that SuDS perform satisfactorily throughout their design life. For example, over time, available storage in retention ponds may decrease through vegetation growth and siltation. Considering future maintenance at the design stage can reduce lifetime costs of SuDS features.

6.14 The following should be considered at the engineering design stage:

• Open forms of storage should generally be over-sized by 30% to allow for vegetation, siltation (and climate change);

• Silt control should be used, for example sediment forebays should be incorporated into the design of any pond features;

• Silt should be managed so that it does not block infiltration systems and filters;

• Vehicular access to areas where silt will be deposited is required to aid removal. Reinforced grass access is appropriate;

• All designs that will require grass mowing should be designed to allow this to be carried out using commercial mowing vehicles. A maximum gradient of 1 in 3 and minimum width of 1.5m is required;

• Discussions with ABC may identify areas where cattle grazing will be used to manage vegetation. Designs should be sympathetic with this requirement;

• Particular attention should be paid to inlets, outlets and controls to ensure ease of access for routine inspection and maintenance, and

• Specified maintenance frequency should accord with design assumptions on reductions in flood storage volumes from silt accumulation.

Brownfield developments

6.15 Brownfield developments can present particular engineering challenges. However, SuDS are often more acceptable in such locations as they can involve shallower excavations than traditional piped systems.

6.16 Generally infiltration devices should not be used where contaminated soil is present. Although if pre-treatment is provided there may be exceptions;

6.17 Source control systems, such as green roofs, and the use of swales, can help to reduce required excavation depths, which can in turn reduce volumes of contaminated material requiring disposal.
Further guidance

**6.18** CIRIA guide C609 provides comprehensive guidance and specifications for SuDS design. Designs should follow the best practice provided in this document, including hydraulic design, water quality and maintenance recommendations unless otherwise stated in this document or required by ABC.
7 Technical guidance - biodiversity

7.1 Many SuDS features, particularly “landscaped” SuDS, can provide wildlife and ecology benefits and could help to achieve the aims set out in the UK and Kent Biodiversity Action Plans (BAPs). Where a proposed development has the potential to disrupt existing habitats, SuDS can provide additional habitat and therefore mitigate potential ecological impacts.

7.2 The design of SuDS for biodiversity needs to be informed by site specific wildlife considerations and integrated within the wider development needs as set out in the Core Strategy. Suitable plant species should be specified so that rapid vegetation occurs to prevent the erosion of SuDS during construction. Rather than making standard specifications, consultants should develop local lists for different parts of the development area comprising species found within 30 km of the site.

7.3 The presence of pollutants in water draining into SuDS features can mean that they are likely to support only relatively robust and common pollution-tolerant species, particularly early in the management train. Typical pollutants in residential and commercial areas can include hydrocarbons and heavy metals from road runoff. The choice of plants should allow for the levels of pollution that are likely to occur.

7.4 Selection of SuDS types should consider habitat creation possibilities and green links – corridors and stepping stones – especially links to Ashford’s Green and Blue Grid. In the town centre, the provision of green roofs can provide habitats where it would be difficult to achieve at ground level.

Drainage and erosion control

7.5 Planting should be appropriate to meet the conveyance requirements in accordance with the engineering design. For swales this is likely to involve an engineering grass seed mix. Planting can also be used for stabilisation of surfaces, erosion control, interception of silt and prevention of silt re-suspension.

Water quality

7.6 Selecting appropriate planting can be very effective in treating pollution; for instance, green roofs, grassed filter strips, swales. In permeable paving, a bioremediation substrate can aid treatment of pollution.

7.7 Plants should be selected that are suitably resistant to the quality of water likely to be received in the SuDS.

Health and safety

7.8 ABC will consider favourably the use of barrier planting to prevent access. Fences are unlikely to be acceptable.
Amenity

7.9 Planting should be provided that gives attractive visual character and all season interest. Where SuDS features are used for other purposes some of the time – such as informal sports / play areas - species appropriate to proposed uses, for example hard-wearing, low growing grasses should be used.

Wildlife

7.10 SuDS features should be created that provide the optimum habitat structure. Opportunities should be sought that encourage wildlife to inhabit SuDS features, such as the provision of nest boxes.

7.11 Where possible, plant species should be allowed to colonise naturally. There is a tendency to over-plant initially to give a natural, established look from the outset, this can result in SuDS features quickly becoming ‘choked’.

7.12 Use local provenance species where possible. ABC will consider plans to include ‘alien species’ where these are particularly appropriate, for example for maintenance or landscape purposes. Invasive species should be avoided.

Management

7.13 The selection of grass types is of particular importance for mowing and maintenance. Where larger trees are used, access for pruning and pollarding should be considered. Provision for the management of green waste should be onsite if possible.

Further guidance

7.14 The Biodiversity Appendix to the Kent Design Guide has a section dedicated to SuDS. It identifies key principles including:

- Land that is already low-lying and wet may be of existing wildlife value and should be retained;
- Use of a sediment forebay to capture sediment can enhance SuDS;
- Maximum wildlife benefit is likely to be achieved from the creation of a series of ponds, together with an associated habitat mosaic of wet, rough grassland, than a single pond;
- Swales are of greatest value to wildlife when they are designed to retain some water for most of the year (though this can make maintenance more onerous); and
- SuDS features requiring regular maintenance should not be designed to attract protected species such as great crested newts or water voles as this will increase the likelihood that work will need to be licensed.
7.15 The Biodiversity index to the Kent Design Guide can be found at http://www.kent.gov.uk/publications/council-and-democracy/kent-design-guide.htm. It also provides useful guidance on general principles of design for wildlife, creating green links, sourcing plant material, ponds and lakes and green roofs. Guidance for designing ponds and wetland to enhance wildlife and amenity provision is also provided in CIRIA C609 (Section 9.11.1) and in CIRIA Book 14.

Swale in residential location. Source: CIRIA
8 Technical guidance - construction

8.1 Development sites within Ashford will be designed to incorporate SuDS to attenuate and treat runoff during their operational phase. However, runoff generated during the construction phase of the developments will also need management and treatment. Some permanent SuDS features can be used for this and some additional temporary works will also be required. Attention to detail during the construction of SuDS is important if they are to be successfully implemented.

8.2 This section highlights the potential risks to SuDS during construction, and outlines those SuDS features that are the most appropriate for use in temporary works. Issues of construction phasing are addressed and a best practice approach for the construction of each type is highlighted. Temporary erosion and sediment control devices are outlined.

SuDS suitable for use during construction

8.3 SuDS that are suitable for use during construction, subject to good management practice, are:

- Swales;
- Detention basins;
- Green roofs;
- Rainwater harvesting systems; and
- Online and offline storage.

Construction risks

8.4 As with all construction activities there is a risk of poor delivery if workers are not familiar with the necessary techniques for the construction of SuDS features. A lack of attention to detail can reduce or remove the effectiveness of the SuDS.

8.5 The main risks to permanent SuDS during the construction phase are caused by:

- Greater sediment volumes during construction than during the operational phase;
- Contaminated silt; and
- Blockages and accumulation of silt causing damage to the permanent SuDS.

8.6 The most important aspect to consider during the construction period is the management and control of silt at all stages to prevent blockages and deposition. This is particularly important where SuDS used to control runoff during construction are subsequently incorporated in the permanent works.
Good practice to adopt during the planning and construction phases is shown in Table 8.1. The design and phasing of temporary SuDS should be in accordance with CIRIA 648.

Pre-construction planning can help ensure the successful delivery of SuDS. Key activities before, during and after construction are:

**Preconstruction Phase**
- Plan site set up (control mechanisms, sequencing, and contingency measures).
- Identify potential for pollution from runoff from compound areas, car parks, haul routes and storage areas.
- Apply for discharge consents if site runoff to be discharged to watercourses (not usually required for domestic surface water run off).

**Construction Phase**
- Monitor water quality at several locations in water bodies around and within the site.
- Monitor erosion and sediment runoff.

**Post Construction Phase- Handover**
- Clean sediment forebays as required.
- Remove temporary structures used within SuDS.
- Ensure permanent SuDS structures are operational.

**Temporary construction sediment and erosion control mechanisms**

Design of temporary construction sediment and erosion control mechanisms should be undertaken in accordance with:

- CIRIA C648, which recommends the installation of sediment and erosion control mechanisms as soon as SUDS features are constructed to prevent damage due to siltation;
- CIRIA C532; and
- Environment Agency Pollution Prevention Guidelines 5 and 6, which give particular focus to silt management.

Sediment control mechanisms that may be used as temporary works in conjunction with SuDS include:
• **Pumping to grassland and filtration infiltration.** This solution is not appropriate for long term use and is only suitable for water that is unpolluted aside from its silt content (i.e. not including chemical or biological pollutants such as oil, concrete or sewage). Performance depends on the infiltration and permeability of the underlying ground.

• **Settlement Ponds.** These Settlement ponds have the advantage of being simple and effective and require less maintenance than other sediment control techniques. They can be converted to permanent SuDS features at the completion of works. Construction site runoff or water is pumped from excavations and channelled into a pond. Contractors must have the consent to discharge effluent from a settlement pond during site works even if it will form part of the permanent system. Advice on the design of settlement ponds for treatment of runoff during construction is provided in CIRIA guidance C648.

• **Filtration.** There are two methods that can be used to remove construction runoff silt prior to discharge. The first method comprises techniques used to trap sediment as water is flowing across site or along channels. The second is filtration by pumping water through steel tanks or skips filled with a suitable filter such as fine single sized aggregate, geotextiles or straw bales.

8.11 Erosion control mechanisms that may be used as temporary works during construction and in conjunction with SuDS include:

• **Seeding and planting.** Temporary stabilisation of soil during construction works to reduce erosion and runoff with high silt content can be achieved through planting of grasses. Temporary stockpiles should be seeded along with any cleared areas where construction activities have ceased, especially if they have steep sides.

• **Geotextiles and mats.** Meshes, netting and sheeting made of natural or synthetic material can be used to stabilise soil temporarily or permanently. They are suited to post construction site stabilisation but may be used for stabilisation of easily eroded soils in sensitive areas including channels and streams where flow may cause erosion.

• **Diversion drains and slope drains.** Diversion drains allow construction runoff to be channel to appropriate areas on site where it can be controlled and treated appropriately. Generally diversion drains are located around disturbed areas and at the toe of stockpiles or cut/fill embankments. Diversion drains are simple to construct and consist of linear ditches with earth bunds. Slope drains allow runoff flowing directly down a slope by confining all the runoff into an enclosed pipe or channel.

• **Check Dams and sediment traps.** Check dams can be constructed across a swale or drainage ditch to reduce the velocity of concentrated runoff thereby reducing the erosion of the swale or ditch and promoting sedimentation. Properly anchored wood, straw bales, hay bales or rock filter bunds may be used.
• **Silt Fence.** A silt fence comprises of a geotextile filter fabric or straw bales or a combination of both and is installed in the path of sheet flow runoff to filter out heavy sediments. Silt fences may be useful to filter out heavy sediments but will not reduce turbidity.

8.12 Some SuDS, such as ponds, can usefully be used to protect watercourses from silt arising during construction. These features need to be restored to their design capacity at the completion of construction;

8.13 Throughout the construction period, appropriate inspections should occur in accordance with adopting / approval agency requirements (ABC, KCC, and Environment Agency).

<table>
<thead>
<tr>
<th>SuDS Technique</th>
<th>Construction Risks</th>
<th>Construction Best Practice</th>
<th>Suitability for temporary works</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Filter Strips</strong></td>
<td>Erosion if used before vegetation is established or no protection provided. Poor attention to detail can result in unevenly graded filter strips.</td>
<td>Allow one full growing season for vegetation to establish before allowing runoff across or provide erosion protection. Design in accordance with C648 and C697 Chapter 21 in particular.</td>
<td>Not suitable. Construction runoff should not be allowed to flow across filter strips.</td>
</tr>
<tr>
<td><strong>Swales</strong></td>
<td>Poor timing of swale construction can result in unacceptable siltation. Flow can bypass swale inlets if surrounding surfaces, including turf, are laid too high and prevent water entering the swale and inlets.</td>
<td>Avoid compacting soil. Runoff should not be allowed into the swale until the vegetation is sufficiently established to prevent erosion of the soils from the side and base. If necessary, control erosion using jute, straw or geosynthetic mats and check dams until vegetation becomes established. Design in accordance with C648 and C697 Chapter 21 in particular.</td>
<td>Suitable if check dams installed and if cleaned appropriately before the contractor hands them over to the owner or operator.</td>
</tr>
<tr>
<td><strong>SuDS Technique</strong></td>
<td><strong>Construction Risks</strong></td>
<td><strong>Construction Best Practice</strong></td>
<td><strong>Suitability for temporary works</strong></td>
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<tr>
<td><strong>Infiltration basins</strong></td>
<td>Risks of soil compaction reducing infiltration. &lt;br&gt; Risks of uneven infiltration due to undulations in constructed basin bed. &lt;br&gt; Risk of infiltration capacity being reduced due to excessive quantities of silt from construction runoff.</td>
<td>Base of infiltration basin must be constructed at an even grade to avoid undulations and promote infiltration. &lt;br&gt; Base and sides of the basin should be stabilised before runoff is allowed to enter it. &lt;br&gt; Construction runoff should not be allowed to enter. &lt;br&gt; Design in accordance with C648 and C697 Chapter 21 in particular.</td>
<td>Possible - If basin is to be used to deal with construction runoff a sacrificial layer should be left in the basin which will need to be removed before the basin’s operational phase (typically 450mm).</td>
</tr>
<tr>
<td><strong>Wet Ponds and Constructed Wetlands</strong></td>
<td>Siltation from runoff during construction. &lt;br&gt; Erosion of inlets, outlets and pond sides during construction until vegetation is established.</td>
<td>Construction runoff should be prevented from entering the ponds. If unavoidable, straw bales should be used to isolate the sediment forebay from the main pond. &lt;br&gt; All construction silt should be removed from the forebay before hand over to the owner. &lt;br&gt; Sides of inlets and outlets should be protected against erosion until the vegetation is established. &lt;br&gt; Design in accordance with C648 and C697 Chapter 21 in particular.</td>
<td>Possible in worst case but not recommended in particular for wetlands.</td>
</tr>
<tr>
<td>SuDS Technique</td>
<td>Construction Risks</td>
<td>Construction Best Practice</td>
<td>Suitability for temporary works</td>
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<tr>
<td>Extended detention basins</td>
<td>Siltation from runoff during construction.</td>
<td>The sediment forebay must be cleaned at the completion of construction before handover to the client.</td>
<td>Suitable if sediment forebay is cleaned appropriately before the contractor hands it over to the owner or operator.</td>
</tr>
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<td>Banks of the basin should be stabilised within two growing seasons to minimise the risk of erosion.</td>
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<td></td>
<td>Area around the inlet and outlet should be stabilised before a basin is commissioned.</td>
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<td>Design in accordance with C648 and C697 Chapter 21 in particular.</td>
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<tr>
<td>Filter drains and perforated pipes</td>
<td>Risk of clogging due to high sediment loads from construction runoff.</td>
<td>Construction runoff should not be allowed into filter strips.</td>
<td>Not suitable.</td>
</tr>
<tr>
<td></td>
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<td>Design in accordance with C648 and C697 Chapter 21 in particular.</td>
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<tr>
<td>Infiltration devices</td>
<td>Soil compaction reducing infiltration.</td>
<td>Construction runoff should not be allowed to enter excavations for soakaways or completed devices as this will cause silting.</td>
<td>No - it is not advised to allow construction runoff to enter soakaways.</td>
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<td>Soils around the sides and base of the infiltration device should not be allowed to become smeared or compacted.</td>
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<td></td>
<td>Design in accordance with C648 and C697 Chapter 21 in particular.</td>
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<tr>
<td>Rainwater Harvesting Systems</td>
<td>Risk of other trades requiring access to roof and damaging system.</td>
<td>Ensure that trades needing access to roof are sequenced appropriately</td>
<td>Suitable. Should be installed as development progresses to reduce runoff volumes.</td>
</tr>
<tr>
<td>Green Roofs</td>
<td>Risk of other trades requiring access to roof and damaging surfacing.</td>
<td>Erosion protection should be provided until vegetation is established (blanket or mulch).</td>
<td>Yes - should be installed as development progresses and will reduce runoff volumes.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ballasting of individual components to prevent uplift due to wind.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Provision of safe access to green roof.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Plant irrigation until full establishment.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Design in accordance with C648 and C697 Chapter 21 in particular.</td>
<td></td>
</tr>
<tr>
<td>Online / Offline storage</td>
<td>Construction plant can impose significant loads on systems before they are provided with final cover.</td>
<td>Prevent construction traffic from driving above storage tanks.</td>
<td>Yes - if silt and blockages are removed prior to handover to owner or operator.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Design in accordance with C648 and C697 Chapter 21 in particular.</td>
<td></td>
</tr>
<tr>
<td>Filtration techniques</td>
<td>Clogging of filter during construction.</td>
<td>The tank structure should be filled with water for 24hr to identify leakages.</td>
<td>No - construction runoff should not be allowed to enter the filter.</td>
</tr>
<tr>
<td></td>
<td>Non level filter beds creating localised filtration with possible early failure.</td>
<td>Design in accordance with C648 and C697 Chapter 21 in particular.</td>
<td></td>
</tr>
<tr>
<td>SuDS Technique</td>
<td>Construction Risks</td>
<td>Construction Best Practice</td>
<td>Suitability for temporary works</td>
</tr>
<tr>
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</tr>
<tr>
<td>Pervious Paving</td>
<td>Clogging and siltation from construction runoff.</td>
<td>Must inform site staff of nature of paving. Once installed paving should not be allowed to collect runoff from elsewhere in the site. Paving should be installed last or protected from site use when completed early. Design in accordance with C648 and C697 Chapter 21 in particular.</td>
<td>No - Permeable paving should never be used to collect construction runoff prior to operational phase.</td>
</tr>
</tbody>
</table>

Table 8.1 Risks to SuDS during construction
9 Submission documents - complying with the standards

Consultation

9.1 Consultation is an essential part of the design process and should be started at the earliest opportunity. This should include the following as a minimum, consultation with:

- The Environment Agency about proposed discharge rates and the control of pollution from the site;
- ABC about the initial proposals for the design, the requirement for any strategic SuDS features and other key planning related issues;
- The sewerage undertaker - Southern Water Services – about availability and capacity of existing sewerage networks, and
- ABC, Kent County Council Highways and Southern Water about the design proposals, within the context of long term maintenance.

9.2 Consultation is expected to be an ongoing part of an iterative design process. Designers should note that PPS25 recommends that developers consult with the Environment Agency and the Internal Drainage Board during design. Appendix H of PPS25 outlines the roles and responsibilities of all parties in relation to drainage and flood risk.

Approval of design

9.3 All designs will require approval both as part of the planning process and by any adopting authorities. It is important that sufficient time is included within the design process for these approvals to take place.

9.4 The Flood and Water Act 2010 gives responsibility for approving sustainable drainage systems in new development, and adopting and maintaining them where they affect more than one property, to a SuDS approving body, generally local authorities. The Act introduces National Standards governing the way in which surface water drainage systems must be constructed and operated.

Pre-application

9.5 The developer should initially consider the advice provided in this SPD, and contact the Council and the Environment Agency with any queries this may raise. It is important at this stage to identify what is the applicable run-off rate for the specific site (from Table 3.1) It is expected that SuDS proposals will be included in the site-specific Flood Risk Assessment (FRA). If a FRA has been submitted at this stage, the Council will check it to ensure that all the necessary information has been provided including the predicted run-off rates and indicative storage requirements.
Outline application (with all matters reserved)

9.6 Effective surface water run-off management should be considered from the outset, and integrated throughout the development. Although specific development information may be limited at this early stage, an outline planning application will still need to give consideration to, and make a commitment to, the requirements of Policy CS20 – including allocating land for SuDS measures such as swales and detention ponds. This will require sufficient detail to be provided with the outline application to enable a judgement to be taken, for example by expressing a maximum development quantum or footprint.

Outline application (with layout and scale to be approved)

9.7 If submitting details for layout and scale as part of an outline application, the Council will expect more detailed information on the proposed form of SuDS to be provided. In line with the Core Strategy the Council will impose planning conditions to ensure that reserved matter applications follow the same route and provide the same documentation that is expected for full applications.

Full application (or approval of reserved matters)

9.8 Full planning applications will need to address the key principles detailed in the earlier chapters of this SPD, as well as committing to all parts of the policy. If the site has a previous outline permission the details being proposed as part of the full application should be in line with previous proposals. If different, a justification should be provided to the Council setting out any differences and reasons for change.

9.9 In demonstrating compliance with Policy CS20 the Council strongly recommends the following are included in the FRA:-

• A location plan identifying which catchment(s) the site falls in;
• an estimation of existing, pre-development run-off rates;
• an estimation of the post development run-off rates;
• calculations showing the required stormwater storage provision;
• details of the proposed SuDS to meet the stormwater storage requirements;
• details of the maintenance requirements for each element of the surface-water management train, identifying who is responsible and the programme for handover (see Section 5 for further details).
The use of planning conditions

9.10 For outline applications with some reserved matters, and for full applications, planning conditions will be imposed to achieve the outcomes of CS20. An example of a standard planning condition for Policy CS20 for both residential and non-residential schemes is shown below:

**Condition**

Development shall not begin until a surface water drainage scheme for the site has been submitted to and approved in writing by the local planning authority. The scheme shall be based on sustainable drainage principles and an assessment of the hydrological and hydro-geological context of the development and shall include a detailed schedule for implementation and proposals for the future maintenance of the scheme.

The scheme shall then be implemented in accordance with the approved details and schedule for implementation. It shall then be retained and maintained in accordance with the approved details.

**Reason**

To prevent the increased risk of flooding, to improve and protect water quality, and improve habitat and amenity.

9.11 The Borough Council will treat securing SuDS by condition with caution. It will only be appropriate to condition the use of SuDS where it is clear from the initial FRA that their use is achievable to the extent that the appropriate run-off rate standard can be met but some of the detail about exactly how that will be achieved is not available. Where there is any doubt that the feasibility of the proposed scheme can be met within the site constraints (particularly whether the space requirements for balancing ponds, swales, reed beds etc can be met), or that it will enable the appropriate run-off rate standard to be met, then the FRA will be deemed inadequate and the application may fail.

9.12 To aid developers, Ashford Borough Council and the Environment Agency have prepared a ‘SuDS Checklist’ (See Appendix 6) which should be submitted in support of applications.

Adoption agreements

9.13 Adoption and maintenance are discussed in Section 10. Thought should be given at the earliest stage as to who ultimately will be responsible for on-going maintenance. Submission documents should be prepared that detail these arrangements.
Agreements for long term maintenance of SuDS with the local authority will generally be in the form of a section 106 agreement under the Town and Country Planning Act. This has two parts, as follows:

- The Agreement; and
- The Maintenance Framework Agreement.

Draft copies of this document are set out in CIRIA C625. There are three different options associated with this Agreement, for either:

- SuDS to be maintained by the local authority;
- SuDS to be vested in the local authority; or
- SuDS to be maintained by a third party.

For strategic SuDS features, it is expected that the SuDS will be vested in the local authority. The local authority may also take responsibility for maintenance of certain SuDS features within the development, in which case it would be more appropriate to use the option where SuDS are maintained by the Council. The preferred method should be agreed on a site by site basis.

The Maintenance Framework Agreement sets out how the SuDS are designed and constructed, together with how they are vested in the relevant parties. It also sets out the requirements for easements and approvals of the SuDS on completion of construction.

Where Kent Highway Services adopt surface water drainage systems as part of the public highway, this will be in accordance with section 38 or 278 of the Highway Act 1980.

Where Southern Water Services adopt any surface water drainage systems, this will be in accordance with section 104 of the Water Industry Act, together with the guidance set out in Sewers for Adoption v6.

Commmuted sums

The adopting authority will require developers to contribute towards the costs of building, operating and maintaining SuDS throughout their design life. These fees will be negotiated on a site-by-site basis.
10 Adoption, management and maintenance

Where SuDS are located in public open space, are designed in accordance with National Standards and this SPD, and appropriate funding mechanisms are in place, they will be adopted by the SuDS Approval Body (SAB). This is the preferred route for adoption and is consistent with the requirements of the Flood and Water Act 2010.

10.1 This section examines the adoption, management and maintenance requirements and arrangements for both on site and strategic SuDS. The section provides information about individual maintenance requirements for SuDS, followed by a review of those statutory authorities who may adopt these features. It also gives information about the adoption process.

10.2 This section of the SPD should be read in conjunction with the drainage systems section of the Kent Design Guide. This provides advice, guidance and information about the design and implementation of drainage systems, including SuDS, for residential and industrial developments.

Maintenance

10.3 Maintenance of all drainage features – including ‘traditional’ piped systems - is essential in order to ensure their successful ongoing operation. SuDS also require effective maintenance, which is no more difficult than maintaining traditional systems but may include a number of different activities or skills. Tables setting out the typical range of maintenance activities for SuDS are included in CIRIA guide C697.

10.4 Planning and building control has recognised SuDS as a way of reducing flood risk and has given priority to their use for some time. However, there has been reticence to incorporate SuDS within new developments: often the reason cited for not installing SuDS is the lack of direction in adoption and maintenance.

10.5 Historically, SuDS have been adopted by a range of bodies including local authorities, water companies, private companies and sometimes by a combination of bodies. A number fall through the system. The absence of a clear adoption and maintenance process has often resulted in developers implementing conventional drainage systems.

10.6 There is also a historic right to connect surface water drainage from buildings and related property (Section 106 and Section 115 of the Water Industry Act 1991) to public surface water and combined sewers where these exist. This provides an easy and well-understood option for developers, but negates opportunities to manage flood risk effectively.
In the Government’s response to Sir Michael Pitt’s Review it is stated that, subject to funding availability, local authorities should take responsibility for adopting and maintaining SuDS in the public realm.

**Flood and Water Act 2010**

10.8 The Flood and Water Act 2010 recognises that previous legislative arrangements for adoption and maintenance have worked against the wide-scale provision of SuDS. The Act addresses this by removing the automatic right to connect to sewers and providing for unitary and county councils to adopt SuDS for new developments and redevelopments.

10.9 The Act introduces National Standards governing the way in which surface water drainage systems must be constructed, and operated. These reflect the need to mitigate flood damage, improve water quality, protect the environment, protect health and safety, and ensure the stability and durability of drainage systems. In all cases, SuDS in roads will be maintained in line with the National Standards.

10.10 The Act requires developers to include sustainable drainage, where practicable, in new developments, built to standards which reduce flood damage and improve water quality. It also amends section 106 of the Water Industry Act 1991 to make the right to connect surface water run-off to public sewers conditional on meeting the National Standards.

10.11 The Act gives responsibility for approving sustainable drainage systems in new development, and adopting and maintaining them where they affect more than one property, to a SuDS approving body, generally county and unitary authorities. This approach is consistent with other roles and responsibilities for county and unitary authorities in England, e.g. coordinating action to prevent and mitigate surface water flooding. In Ashford, the County Council is already responsible for adopting, draining and maintaining highways – roads, pavements and verges.

10.12 The Act introduces an approval system for the surface water drainage systems of the majority of new developments, including roads, in line with the National Standards. Furthermore it places a requirement on unitary and county local authorities in England to adopt and maintain new SuDS which affect the drainage of other properties.

10.13 It is also now a requirement on developers to demonstrate that they have met National Standards for the application of SuDS techniques before they can connect any residual surface water drainage to a public sewer (amending section 106 of the Water Industry Act 1991).
10.14 These National Standards are a material consideration in local authorities’ planning decisions. This means that the standards are the underlying approach to surface water drainage, except in those cases where other local planning considerations outweigh them. The standards also provide the basis for approval, adoption and connection to the public sewer.

10.15 The SuDS approving body (SAB) is required to adopt and maintain the majority of surface water drainage systems within the public realm, so the systems need to be robust. If plans for the surface water drainage do not meet the required standard, there is no automatic right to connect to a public sewer. There is an added incentive for developers to achieve the required standard for surface water drainage through an arrangement whereby the developer may be required to deposit a financial bond with the SuDS approving body.

10.16 The Act includes a provision to enable the Minister to make regulations about the timing and procedure for determining applications for approval, and to specify what should happen if the timetable set is not complied with. This is to ensure that the SuDS approval process is fully in line with the timetable for determining planning applications.

Interim arrangements

10.17 Until such time as a SuDS approval body has been established and National Standards been approved, the Borough Council will expect developers to propose schemes that comply with CIRIA guidance and this SPD.

10.18 Until such time that the SAB adopts newly built SuDS, it is anticipated that the Borough Council will adopt and maintain approved SuDS; with the anticipation that they will be subsequently handed over to the SAB, along with any associated commuted sums.

10.19 Developers drainage proposals will be made to the planning authority and approval for the surface water drainage will be needed before development can begin. This approval will form the basis for adoption where appropriate and there will be no right to make a new connection to surface water sewer without approval of the SuDS proposals.

10.20 Wherever possible, SuDS techniques, excluding source control methods such as water butts, shall be located in the public realm to facilitate access for maintenance by the SAB or its agents.

Funding of SuDS maintenance

10.21 At present the majority of surface water sewer maintenance is funded by water customers through water and sewerage bills. Historically, there have been several different mechanisms for funding maintenance of SuDS. These include:
• commuted sums from the developer to a maintenance firm with the potential for additional funding from residents;

• commuted sums from the developer to the local authority;

• the revenue support grant; and

• water and sewerage bills.

10.22 Until such time that the SAB adopts newly built SuDS, it is anticipated that the commuted sum mechanism will be the most appropriate, with the Borough Council adopting and maintaining approved SuDS. This would be through a Section 106 agreement or alternative funding mechanism.

Private SuDS

10.23 Where SuDS features – such as source control measures - are located in private areas the site occupier / owner will usually be responsible for maintenance. It is recommended that details of the management and maintenance requirements are included the information supplied to householders. This is particularly important for permeable paving of private drives, green roofs and rainwater harvesting systems.

10.24 There is the potential for long term maintenance to be carried out by third parties, such as a maintenance company or trust. This is the least preferred option. Where this is the case, the details should be discussed in detail with the Council. It is likely that there will be additional requirements placed on a developer should the drainage not be adopted by a statutory authority. The use of private ‘management companies’ to maintain SuDS is discouraged in residential areas but may be appropriate for commercial uses.

Options for long term maintenance

10.25 A range of SuDS may be required within new developments in order to produce an effective drainage system. These features have different maintenance requirements and design lives and it is important that an appropriate management system is put in place for all SuDS. An assessment of management requirements should be made on a site-by-site basis.
# Appendix 1: Glossary of terms and acronyms

This glossary includes terms, phrases and abbreviations that may be cause confusion to those unfamiliar with SuDS.

<table>
<thead>
<tr>
<th>Term / acronym</th>
<th>Definition / meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABC</td>
<td>Ashford Borough Council</td>
</tr>
<tr>
<td>Attenuation</td>
<td>Reduction of peak flows and increased duration of flow event.</td>
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<tr>
<td>Balancing pond</td>
<td>A pond designed to attenuate flows by storing runoff during a rainfall event and releasing it at a controlled rate. The pond always contains some water.</td>
</tr>
<tr>
<td>BAP</td>
<td>Biodiversity Action Plan</td>
</tr>
<tr>
<td>Basin</td>
<td>A depression in the ground acting as a flow control or water treatment structure, designed to detain water temporarily (detention basin) or retain water permanently (retention basin)</td>
</tr>
<tr>
<td>Berm</td>
<td>A mound of earth formed to control the flow of surface water</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>The diversity of plant and animal life in a particular habitat.</td>
</tr>
<tr>
<td>Bioretention area</td>
<td>A depressed area designed to collect runoff so that it percolates through the soil into a drain thereby promoting pollutant removal.</td>
</tr>
<tr>
<td>Block paving</td>
<td>A pre-cast concrete or clay brick modular paving system. Can be used to form permeable paving.</td>
</tr>
<tr>
<td>BRE</td>
<td>Building Research Establishment</td>
</tr>
<tr>
<td>BREEAM</td>
<td>Building Research Establishment Environmental Assessment Method</td>
</tr>
<tr>
<td>BS</td>
<td>British Standard</td>
</tr>
<tr>
<td>Bund</td>
<td>A barrier, dam, mound or suchlike, usually formed of earthworks, used to contain or exclude water (or other fluids).</td>
</tr>
<tr>
<td>CAMS</td>
<td>Catchment Abstraction Management Strategy</td>
</tr>
<tr>
<td>Catchment</td>
<td>The area contributing surface water flow to a point on a drainage or river system</td>
</tr>
<tr>
<td>CDM</td>
<td>Construction Design Management Regulations 2007</td>
</tr>
<tr>
<td>CESWI</td>
<td>Civil Engineering Specification for the Water Industry</td>
</tr>
<tr>
<td>Term / acronym</td>
<td>Definition / meaning</td>
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<tr>
<td>CFMP</td>
<td>Catchment Flood Management Plan</td>
</tr>
<tr>
<td>CIRIA</td>
<td>Construction Industry Research Association</td>
</tr>
<tr>
<td>Combined sewer</td>
<td>Sewer that takes both foul and surface water</td>
</tr>
<tr>
<td>Constructed wetland</td>
<td>Specifically designed wet area with shallow water and aquatic vegetation that provide biofiltration</td>
</tr>
<tr>
<td>Conventional drainage</td>
<td>The traditional method of draining surface water using underground pipes.</td>
</tr>
<tr>
<td>Conveyance</td>
<td>Moving water from one location to another – swales / pipes are conveyance systems.</td>
</tr>
<tr>
<td>CSO</td>
<td>Combined sewer overflow (outfall)</td>
</tr>
<tr>
<td>DCLG</td>
<td>Department for Communities and Local Government</td>
</tr>
<tr>
<td>Detention basin</td>
<td>Basins that contain water during periods of runoff; normally dry.</td>
</tr>
<tr>
<td>EA</td>
<td>Environment Agency</td>
</tr>
<tr>
<td>EMP</td>
<td>Environmental Management Plan</td>
</tr>
<tr>
<td>Filter drain</td>
<td>A linear drain consisting of a trench filled with a permeable material, often with a perforated pipe in the base of the trench to assist drainage. Sometimes referred to as a ‘French drain’</td>
</tr>
<tr>
<td>Filter Strip</td>
<td>A vegetated area of gently sloping ground designed to drain water evenly off impermeable areas. Useful in removing silt sand other particulates.</td>
</tr>
<tr>
<td>Filtration techniques</td>
<td>Methods to remove sediment and other particles from a fluid by passing it through a filter.</td>
</tr>
<tr>
<td>Forebay</td>
<td>A small basin or pond upstream of the principal drainage feature with the function of trapping sediment. Should be designed to allow ease of access.</td>
</tr>
<tr>
<td>FRA</td>
<td>Flood Risk Assessment</td>
</tr>
<tr>
<td>Freeboard</td>
<td>The distance between the design water level and the top of a structure before it overtops. It is provided as a safety measure against early system failure.</td>
</tr>
<tr>
<td>French drain</td>
<td>A filter drain.</td>
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<tr>
<td>GADF</td>
<td>Greater Ashford Development Framework</td>
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<tr>
<td>Term / acronym</td>
<td>Definition / meaning</td>
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<tr>
<td>Geocellular storage</td>
<td>Underground stormwater storage formed from a plastic box structure (similar to milk crates).</td>
</tr>
<tr>
<td>Geomembrane</td>
<td>An impermeable plastic sheet.</td>
</tr>
<tr>
<td>Geotextile</td>
<td>A permeable plastic fabric.</td>
</tr>
<tr>
<td>Green roof</td>
<td>A roof with plants growing on its surface which provides some retention, attenuation and treatment of rainwater and contributes to biodiversity. Ideal for commercial buildings.</td>
</tr>
<tr>
<td>Infiltration</td>
<td>The passage of surface water into the ground.</td>
</tr>
<tr>
<td>Infiltration basin</td>
<td>A dry basin designed to promote surface water into the ground.</td>
</tr>
<tr>
<td>Infiltration device</td>
<td>A feature specifically designed to aid infiltration into the ground.</td>
</tr>
<tr>
<td>Infiltration trench</td>
<td>A linear feature designed to aid infiltration of surface water into the ground.</td>
</tr>
<tr>
<td>IWMS</td>
<td>Integrated Water Management Strategy</td>
</tr>
<tr>
<td>KCC</td>
<td>Kent County Council</td>
</tr>
<tr>
<td>LDF</td>
<td>Local Development Framework</td>
</tr>
<tr>
<td>Management Train</td>
<td>The concept of the SuDS management train is commonly used by the industry and addresses the quality and quantity of runoff at all stages of a drainage system. It uses drainage techniques in series to improve the quality and quantity of runoff incrementally by reducing pollution, flow rates and volumes. The management train provides a hierarchy of techniques in order of preference. These are prevention, source control, site control and strategic or district control.</td>
</tr>
<tr>
<td>Off-Site SuDS</td>
<td>See Strategic SuDS</td>
</tr>
<tr>
<td>On-Site SuDS</td>
<td>Those SuDS techniques that can be used to control runoff close to the source and would be implemented within the development boundaries. Such techniques could include filter strips, swales and green roofs. Small and medium sized ponds and wetlands could also be used.</td>
</tr>
<tr>
<td>Open channel</td>
<td>A means of conveying water as opposed to a piped system.</td>
</tr>
<tr>
<td>Orifice plate</td>
<td>A simple flow control device.</td>
</tr>
<tr>
<td>Term / acronym</td>
<td>Definition / meaning</td>
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</tr>
<tr>
<td>Permeable paving</td>
<td>A surface that is paved and drains through voids between solid parts of the pavement.</td>
</tr>
<tr>
<td>Pervious surface</td>
<td>A surface that allows flow of rainwater into the underlying construction or soil.</td>
</tr>
<tr>
<td>Porous Surface</td>
<td>A surface that allows water to infiltrate across the whole surface; e.g. grass, gravel.</td>
</tr>
<tr>
<td>POS</td>
<td>Public Open Space.</td>
</tr>
<tr>
<td>PPG</td>
<td>Planning Policy Guidance</td>
</tr>
<tr>
<td>PPS</td>
<td>Planning Policy Statement</td>
</tr>
<tr>
<td>Rain garden</td>
<td>A type of bioretention area.</td>
</tr>
<tr>
<td>Rainwater harvesting</td>
<td>A system for collecting rainwater where it falls (at source) and putting it to positive use – e.g. irrigation. Can be simple rain butts through to tanks providing water for flushing toilets.</td>
</tr>
<tr>
<td>Retention basins</td>
<td>Basins that contain additional water during periods of runoff; normally retain some water.</td>
</tr>
<tr>
<td>Rill</td>
<td>A small open channel for conveying water, usually in an urban setting.</td>
</tr>
<tr>
<td>RoSPA</td>
<td>Royal Society for the Prevention of Accidents</td>
</tr>
<tr>
<td>SA</td>
<td>Sustainability Appraisal</td>
</tr>
<tr>
<td>SAB</td>
<td>Sustainable drainage Approval Body</td>
</tr>
<tr>
<td>Soakaway</td>
<td>A type of infiltration device</td>
</tr>
<tr>
<td>Source control</td>
<td>SuDS features that control rainwater where it falls – the top of the management train.</td>
</tr>
<tr>
<td>SPD</td>
<td>Supplementary Planning Document</td>
</tr>
<tr>
<td>SPG</td>
<td>Supplementary Planning Guidance</td>
</tr>
<tr>
<td>SPZ</td>
<td>Source Protection Zones</td>
</tr>
<tr>
<td>Strategic SuDS</td>
<td>Those SuDS techniques that are located lower downstream on the management train. These strategic SuDS features would treat runoff from larger catchments areas and would be located, where possible, on land adjacent to the development site.</td>
</tr>
</tbody>
</table>
### Appendix 1: Glossary of terms and acronyms

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<thead>
<tr>
<th>Term / acronym</th>
<th>Definition / meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>SuDS</td>
<td>Sustainable Drainage System</td>
</tr>
<tr>
<td>SuDS features</td>
<td>This term refers to all possible methods and practices used to implement sustainable drainage. By extension a SuDS feature is one particular way of achieving sustainable drainage, it could for instance refer to a swale or a detention pond. Any number of SuDS techniques can be used to achieve a sustainable drainage system.</td>
</tr>
<tr>
<td>Swale</td>
<td>A shallow vegetated channel designed to retain and convey water. The vegetation filters particulate matter.</td>
</tr>
<tr>
<td>Vortex flow control</td>
<td>A control device that induces a spiral / vortex into the water to restrict the flow forward that provides superior hydraulic performance over conventional flow regulators.</td>
</tr>
<tr>
<td>Water Butt</td>
<td>A source control device usually fitted to the downpipe to collect rainwater for subsequent reuse – a type of source control.</td>
</tr>
<tr>
<td>Wet pond</td>
<td>Permanently wet depression designed to retain stormwater above the permanent water level.</td>
</tr>
<tr>
<td>WRMU</td>
<td>Water Resources Management Unit</td>
</tr>
</tbody>
</table>
Appendix 2: SuDS Types

This is a supporting document and is available from the main consultation page.
Appendix 3: Case studies

This is a supporting document and is available from the main consultation page.
Appendix 4: Rainfall - Runoff and stormwater storage estimation

Introduction

A4.1 This guidance is aimed at developers and their consultants to advise on the management of stormwater drainage for developments and in particular to assist in the initial sizing of storage elements for the control and treatment of stormwater runoff.

A4.2 This guidance may be used to form part of a Flood Risk Assessment to comply with PPS 25, but it does not address issues such as risk of flooding from a watercourse, effects of changes in floodplain storage or in floodplain conveyance.

A4.3 It is stressed that the approach provided for sizing of stormwater storage is only to be used at outline planning application stage to assist with defining indicative volumes. Detailed analysis will be required to determine actual storage requirements. It is appreciated that the method outlined is likely to over-estimate the storage required as it does not optimise the rainfall / runoff / storage.

A4.4 To assist developers and their consultants a Sustainable Drainage Checklist has been produced (see Appendix 6)

The calculation of greenfield run-off rate

A4.5 For most sites, the maximum discharge will be that set out in table 3.2 of this SPD, depending on location.

A4.6 However, for some sites it will be necessary to limit flow to less than the pre-existing run-off rate. In these instances the consultant should calculate the two-year peak flow rate and limit discharge to this rate: nominally 11.4 l/s/ha assuming 100% impermeability (see Table A.1)

A4.7 The calculation of peak rates of runoff from a greenfield site is related to its size. The following approach is acceptable for sites between 0 – 50 ha and is based on The Institute of Hydrology Report 124 Flood Estimation for Small Catchments (1994). The analysis for determining the peak discharge rate should use 50 ha in the formula and linearly interpolate the flow rate value based on the ratio of the development to 50 ha. FSSR 2 and 14 regional growth curve factors are to be used to calculate the greenfield peak flow rates for 2, 30 and 100 year return periods.

A4.8 For sites between 50 ha – 200 ha IoH Report 124 should be used to calculate greenfield peak flow rates. Regional growth factors to be applied.

A4.9 For sites above 200 ha it is recommended that the Flood Estimation Handbook (FEH) should be applied. Both the statistical approach and the unit hydrograph approach should be used to calculate peak flow rates. The unit hydrograph method will also provide the volume of greenfield run-off.

The calculation of brownfield run-off rate
A4.10 For previously developed, brown-field sites, a network analysis of the surface water drainage system can be used to determine the existing run-off rate.

A4.11 In the absence of a network analysis a simple Rational (Lloyd – Davis) approach is acceptable:

\[ Q = A \times P \times i \]

\[ 0.36 \]

Where \( Q \) = run-off in l/s

\( A \) = Area in hectares

\( P \) = Percentage impermeability (e.g 0.9 where 10% of the site is assumed to soakaways – for most of Ashford this figure will be 1.0)

\( I \) = rainfall intensity in mm/hr

A4.12 Different rainfall events have different impacts. At a site level it is usually the short duration, very intense rainfall event that causes drainage systems to be overwhelmed. Whereas at a river catchment level it is usually the prolonged, less intense rainfall event that cause river systems to flood. In Ashford, the wide scale usage of SuDS is required to reduce the risk of flooding at a river catchment scale, whilst at the same time protecting the site from short duration, intense rainfall events. As such, SuDS design will be, by necessity, a compromise. For Ashford the catchment characteristics suggest a six hour rainfall event is appropriate for design purposes. A consequence of this is that surface water storage volumes are likely to be higher than would be necessary to purely protect the site. This should be allowed for in site layouts and design.

A4.13 For Ashford the following rainfall intensities are deemed acceptable based on a six hour event.

<table>
<thead>
<tr>
<th>Point Rainfall (mm)</th>
<th>2yr</th>
<th>1.0yr '1' mm/hr</th>
<th>30yr</th>
<th>30yr '1' mm/hr</th>
<th>100yr</th>
<th>100yr '1' mm/hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>60min</td>
<td>13.4</td>
<td>13.4</td>
<td>34.4</td>
<td>34.4</td>
<td>50.3</td>
<td>50.3</td>
</tr>
<tr>
<td>120min</td>
<td>17.0</td>
<td>8.5</td>
<td>41.5</td>
<td>20.7</td>
<td>59.5</td>
<td>29.7</td>
</tr>
<tr>
<td>240min</td>
<td>21.4</td>
<td>5.3</td>
<td>50.0</td>
<td>12.5</td>
<td>70.4</td>
<td>17.6</td>
</tr>
<tr>
<td>360min</td>
<td>24.6</td>
<td>4.1</td>
<td>55.8</td>
<td>9.3</td>
<td>77.7</td>
<td>12.9</td>
</tr>
<tr>
<td>600min</td>
<td>29.2</td>
<td>2.9</td>
<td>64.1</td>
<td>6.4</td>
<td>87.9</td>
<td>8.8</td>
</tr>
</tbody>
</table>

Table A.1 RAINFALL INTENSITIES
I = 4.1 mm/hr (2 year storm) [i.e. 11.4 l/s/ha assuming 100% imp]

I = 9.3 mm/hr (30 year storm) [i.e. 25.8 l/s/ha]

I = 12.9 mm/hr (100 year storm) [i.e. 35.8 l/s/ha]

A4.14 The maximum discharge rate from brownfield sites shall not exceed the run-off arising from the equivalent of a two-year rainfall event:

Q = A x P x 4.1

0.36

Estimating the volume required to store stormwater run-off

A4.15 The Environment Agency has simplified the storage requirements by providing a Sustainable Drainage Checklist that enables the storage to be calculated using site specific data and estimated volumes of storage.

A4.16 The storage volumes per hectare based on the discharge rates included in Table 3.1 of the main report and Percentage Impermeability (P) values of 0.5, 0.75 and 1 are shown in Table A.2 below.

<table>
<thead>
<tr>
<th>P</th>
<th>1.0</th>
<th>0.75</th>
<th>0.5</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>Limited discharge l/s/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>1192</td>
<td>894</td>
<td>596</td>
<td>526</td>
<td>432</td>
<td>363</td>
<td></td>
</tr>
<tr>
<td>0.75</td>
<td>1122</td>
<td>842</td>
<td>561</td>
<td>526</td>
<td>432</td>
<td>357</td>
<td></td>
</tr>
<tr>
<td>0.5</td>
<td>1052</td>
<td>789</td>
<td>526</td>
<td>526</td>
<td>432</td>
<td>357</td>
<td></td>
</tr>
<tr>
<td></td>
<td>863</td>
<td>647</td>
<td>432</td>
<td>432</td>
<td>432</td>
<td>432</td>
<td></td>
</tr>
</tbody>
</table>

Table A.2 STORAGE VOLUME (m³/Ha)

A4.17 It is expected these storage volumes will be used for both greenfield and brownfield sites except in situations where a higher brownfield run-off rate has been agreed with the Local Planning Authority.

Background for determining the volume required to store stormwater run-off

A4.18 The volume of rainfall runoff is important at each of end of the rainfall spectrum. Around 30 to 40 percent of rainfall events (probably in excess of 50 events a year in most areas), are sufficiently small that there is no measurable runoff taking place from greenfield areas into receiving waters. By contrast, runoff from developments takes place for virtually every rainfall event. The difference means that streams are more “flashy” and groundwater recharge is being reduced, thus reducing base flows in the streams between events.
The above is important for Ashford given that it is located towards the top end of the Stour catchment and that the Stour is naturally a slowly reacting watercourse, with a steady chalk-fed base flow. The historic development of Ashford and other changes in land use, have made the catchment more flashy. New development should seek to return the river to a more natural state through wide provision of SuDS.

The criterion of provision of storage and release of stormwater dealing with volume of runoff does not specifically address the important issue of small and large scale rainfall events. However, where it is possible to provide replication of this behaviour in being able to prevent runoff from rainfall of up to 5mm, this should be provided. Certain SuDS features such as swales and pervious pavements do provide runoff characteristics that reflect this behaviour to some degree.

The quality of stormwater runoff is an issue for small events. This is due to the flush of debris and sediment from paved surfaces being “washed off” in the first part of the event together with any sediment deposits in the pipe network. This is compounded by the fact that this highly concentrated initial flow enters the receiving water which is still flowing at base flow conditions, thus providing a minimum level of dilution.

For large events, or during periods of high river flow, this water quality impact is much reduced, so the key period of concern is the summer months of low river flows and the many small events which take place on a regular basis. The concept of treatment storage is to provide a body of water in which dilution and partial treatment (by physical, chemical and biological means) of this runoff can take place. This is effectively the volume of water which remains in ponds during the dry weather periods between rainfall events. The amount of storage normally provided is the volume of runoff from 10 to 15mm of rainfall.

Clearly, if no runoff takes place for small events, maximum water quality protection is being achieved. Designers should aim to include source control features to provide storage for this ‘first flush’ and small-scale, frequent rainfall event. This ‘treatment storage’ aims to ensure the water quality of the stormwater is sufficient to cause minimal impact on the flora and fauna in the receiving water. This is normally provided as the dry period volume of ponds.

In extreme rainfall events the total volume of runoff from a developed site is typically between 1 and 10 times the runoff volume from the same site in a greenfield state. It is important to control this additional volume from the developed site for two reasons:

- A large proportion of runoff tends to be released much more quickly than the greenfield runoff (even where attenuation storage is provided to address the difference in the rate of runoff);
- Even if it were released over a similar period to the greenfield runoff, due to the finite storage volume provided by flood plains, by definition there must be greater depths of flooding if more water is discharged.
A4.25 The criterion for long term storage is a pragmatic approach to calculating an appropriate volume which should be retained and discharged at sufficiently low flow rates to the receiving water, such that there is limited impact on exacerbating flooding downstream. This is achieved by either the use of infiltration or sufficient attenuation that discharge from the development is below the required maximum discharge rate. Theoretically this form of storage need only be mobilised at times of extreme rainfall. However in practice it is difficult to mobilise this storage only during extreme events.

A4.26 The basis of calculating the long term storage volume is to use a 6 hour 100 year event. It should be noted that although the 6 hour 100 year event is used to define the storage volume needed, the type of events which require this volume to be mobilised (to protect rivers during flooding) are generally much longer, low intensity events.

A4.27 The long-term storage aims to limit the rate of runoff into the receiving water to similar rates of maximum discharge as that which takes place before the site is developed (greenfield runoff rate). This can be provided at one or several different locations using a variety of SuDS techniques. In addition, it should seek to address the additional volume of runoff caused by the development. This is either infiltrated into the ground or, if this is not possible due to soil conditions, attenuated and discharged at very low rates of flow to the receiving watercourse so as to minimise the risk of exacerbating river flooding.

A4.28 When considering small sites with minimum discharges it is important to take account of a minimum practical control sizes where an orifice or vortex flow control device is proposed. This may be an orifice of 150mm diameter for reasons of adoption, stipulated by the sewerage undertaker. (It should be noted that this does not preclude lower limiting discharge rates where appropriate use of SuDS is applied).

A4.29 When sizing SuDS it is expected that additional storage is provided to accommodate climate change impacts and to allow for siltation and vegetation, both of which take up storage volume. In the Checklist a Flood Estimation Handbook approach is used to take account of climate change, and loss of storage to siltation and vegetation is overcome by applying an allowance (nominally +30%) to the storage provision.

Completing the Sustainable Drainage Checklist

A4.30 The Checklist aims to help developers demonstrate compliance with CS20, and should be included with the Flood Risk Assessment.

A4.31 Site location details should be included to enable the site to be positioned within a specific catchment. If this is not obvious, the Environment Agency should be consulted to confirm which catchment characteristics should be used. For sites falling in two or more catchments it is advisable to complete a Checklist for each catchment.
A4.32 The size of the site should be the whole site – including large areas of greenspace - in hectares.

A4.33 The developable area is the size of the site excluding large undeveloped areas being allocated as public open space which remain unmodified – i.e. not positively drained, again in hectares.

A4.34 The Percentage Impermeability (P) will range from 0 – 1.0. This value relates to the density of the development and the potential for permeability. For most developments in Ashford this figure will be 1.0. For sites of lower density a figure of 0.75, or, exceptionally, 0.5 may be appropriate. For very low density sites where the value is less than 50% (i.e. where pervious area is the main surface type) a more detailed study should be made as the storage estimates may be undersized.

A4.35 The Percentage Impermeability (P) figure can be adjusted down for high-density sites if green roofs, permeable paving etc are used. For example, if 10% of the site incorporates permeable paving then this value will be 0.9. At outline design stage it is recommended that the Percentage Impermeability is set as 1.0.

A4.36 The current use and the catchment are the parameters used in Table 3.1 to determine the allowable run-off rate. If 2, 4 or 6 l/s/ha are not used an estimation of greenfield / brownfield run-off will have to be calculated – nominally 11.4 l/s/ha.

A4.37 The maximum discharge (total run-off) is determined by multiplying the allowable run-off rate by the developable area.

A4.38 For standard discharge rates (2 / 4 / 6 / 11.4 l/s/ha) and P = 1.0, 0.75 or 0.5, the attenuation storage volume per unit area can be looked up directly from Table A.2. For other discharge rates up to 11.4 l/s/ha or other values of P over 0.5 it is possible to use Table A.2 and extrapolate the required storage. For P = less than 0.5 or non-standard discharge rates over 11.4 l/s/ha, empirical methods will be required.

A4.39 The estimated Storage Requirement given in Table A.2 has a factor for climate change (1.25) and siltation / vegetation (1.3) already built-in.

A4.40 To obtain the total storage required it is necessary to multiply the attenuation storage volume per unit area (m3/Ha) by the development area (Ha).

**Worked examples**

**Example 1**

Consider a greenfield site of four hectares to the south east of the town. Three hectares are to be developed for a dense, mixed-use development. The remaining hectare is allocated for public open space which will not be positively drained.

The location of the site places it in the Stour catchment, south of the M20. It is greenfield so from Table 3.2 the maximum permitted discharge rate is 4 l/s/ha.
The size of the site is 4 hectares. The developable area is 3 hectares. None of the site drains to soakaways and the development is of high density with no permeable paving / green roof therefore the Percentage Impermeable (P) value is 1.0.

From Table A.2 the required storage is 1122 m3/Ha. The total storage volume will be 1122 x 3 = **3366 m3**. Assuming an average depth of 1.0 metre it would be prudent to allow 0.34 Ha for SuDS.

**Example 2**

Consider a greenfieldsite of six hectares to the north east of the town. Five hectares are to be developed for a medium density housing development with one hectare allocated for public open space which will not be positively drained. The five hectares of development will incorporate green roofs and extensive permeable paving.

The location of the site places it in the Stour catchment, north of the M20. It is greenfield so from Table 3.1 the maximum permitted discharge rate is 2 l/s/ha.

The size of the site is 6 hectares. The developable area is 5 hectares. The site is medium density so the Percentage Impermeable (P) value is 0.75. It is proposed to use permeable paving and green roofs so the Percentage Impermeable Value can be further reduced by, say, 0.1 therefore use P = 0.65.

Interpolating from Table A.21 the required storage is 780 m3/Ha. The total storage volume will be 780 x 5 = **3900 m3**. Assuming an average depth of 1.0 metre it would be prudent to allow 0.39 Ha for SuDS.

**Example 3**

Consider a town centre brownfield regeneration site of two hectares to the south east of the town. The whole site is to be developed for a dense, mixed-use development. All of the site will be positively drained to a nearby watercourse.

The location of the site places it in the Stour catchment, south of the M20. It is brownfield so from Table 3.1 the developer should use ‘Best endeavours’ to achieve 4 l/s/ha; failing that, aim to achieve a reduction from the existing run-off rate; as an absolute minimum must not lead to net increase in run-off rate. Nominally 11.4 l/s/ha.

Firstly considering the ‘best endeavours’ approach (4 l/s/ha):

The size of the site is 2 hectares. The developable area is 2 hectares, all of which will be positively drained. The development is of high density with no permeable features so the Percentage Impermeable value is 1.0

From Table A.2 the required storage is 1122 m3/Ha. The total storage volume will be 1122 x 2 = **2244 m3**.

Secondly, considering a reduction from the ‘brownfield’ situation. No network analysis is available so use nominal 11.4 l/s/ha
From Table A.2 the required storage is 863 m3/Ha. The total storage volume will be 863 x 2 = **1726 m³**.

The minimum storage to be allowed for is 1726 m³, but best endeavours should be used to try and achieve 2244 m³.
Appendix 5: Useful Contacts

Planning and legislation references

Ashford Borough Local Development Framework Core Strategy; Submission Document; November 2006; Ashford Borough Council

Draft South East Plan Regional Spatial Strategy. South East Regional Assembly; 2006;
http://www.southeast-ra.gov.uk/southeastplan/plan/view_plan.html

Greater Ashford Development Framework; 2005; ABC Urban Initiatives

http://www.gos.gov.uk/gose/planning/regionalPlanning/southEastPlan/

Kent County Council and Medway Council; 2006. Kent and Medway Structure Plan,
http://www.kmsp.org.uk/pdfs/KMSPAdoptedPolsKDJul06.pdf

Model Agreements for sustainable management systems, Model Agreement for SUDS (C625); 2004; CIRIA; London

Planning & Compulsory Purchase Act 2004 2004,
http://www.opsi.gov.uk/acts/acts2004/ukpga_20040005_en_1

Reservoirs Act; 1975; Environment Agency, UK

South East Plan Sustainability Appraisal Scoping Report;
http://www.seeda.co.uk/res/docs/DraftSustainabilityReport070406.pdf

The Ashford Borough Local Plan, Ashford Borough Council, 2000
http://www.ashford.gov.uk/planning_and_building_control/planning_now_and_in_the_future/local_plan.aspx


The Saved Policies of the 2000 Ashford Borough Local Plan, 28th September 2007
Appendix 5: Useful Contacts


**Town and Country Planning Act;** 1990 (c. 8); The Stationery Office Limited.


1.1 Landscape references

**Ashford Integrated Water Management Study;** Environment Agency/Black and Veatch, 2005


**Kent Design Guide;** 2005/2006;


**Kent Downs Area of Outstanding Natural Beauty Landscape Design Guide;**
http://www.kentdowns.org.uk/landscapehandbook.html

**Kent Landscape Assessment;** 2004; Kent County Council, English Nature,
http://extranet7.kent.gov.uk/klis/home.htm

**Kent Landscape Information System Website;**
http://extranet7.kent.gov.uk/klis/home.htm

**Planning Policy Statement 1-Delivering Sustainable Development;** 2005;
http://www.communities.gov.uk/planningandbuilding/planning/planningpolicyguidance/planningpolicystatements/planningpolicystatements/pps1

**Planning Policy Statement 7- Sustainable Development in Rural Areas;** 2004;
Appendix 5: Useful Contacts

http://www.communities.gov.uk/planningandbuilding/planning/planningpolicyguidance/planningpolicystatements/planningpolicystatements/pps7

Planning Policy Statement 9: Biodiversity and Geological Conservation; 2005;
http://www.communities.gov.uk/planningandbuilding/planning/planningpolicyguidance/historicenvironment/pps9/

Planning Policy Statement 25: Development and Flood Risk, 2006;
http://www.communities.gov.uk/planningandbuilding/planning/planningpolicyguidance/planningpolicystatements/planningpolicystatements/pps25

Kent & Medway Structure Plan Supplementary Planning Guidance 2 Biodiversity Conservation;
http://www.kmsp.org.uk/

Sustainable Communities Plan, Department for Communities & Local Government
http://www.communities.gov.uk/communities/sustainablecommunities/

http://www/english-nature.org.uk/special/greenspace/

http://www/english-nature.org.uk/special/greenspace/

Supplementary Planning Guidance 2 Biodiversity Conservation SPG2;
http://www.kmsp.org.uk/

The Landscape Assessment of Kent; 2004; KCC and Babtie


Towards a Green Blue Grid; 2006, Country Side Agency
http://www.ashfordbestplaced.co.uk/
Appendix 5: Useful Contacts


1.2 Biodiversity references

Ashford Integrated Water Management Study; Environment Agency/Black and Veatch, 2005

Biodiversity by design - a guide for sustainable communities; 2004; Town and country Planning Association


English Nature’s Urban Greenspace standard;


Kent & Medway Structure Plan Supplementary Planning Guidance 2 Biodiversity Conservation SPG2;

http://www.kmsp.org.uk/

Kent and Medway Biological Records Centre http://www.kmbrc.org.uk/

Kent Biodiversity Action Plan; 1997; Kent Biodiversity Action Plan Steering Group,

http://www.kentbap.org.uk/

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http://www.kmbrc.org.uk/habitatdata.htm

Kent Stour Local Environment Agency Action Plan (LEAP); 2000; Environment Agency,

Local Nature Reserves,
Appendix 5: Useful Contacts

http://www.english-nature.org.uk/Special/lnr/lnr_search.asp

Maximising the Ecological Benefits of Sustainable Drainage Systems,

Natural History Museum Postcodes Database,
http://www.nhm.ac.uk/nature-online/life/plants-fungi/postcode-plants/

Planning Policy Statement 9-Biodiversity and Geological Conservation; 2005;
http://www.communities.gov.uk/planningandbuilding/planning/planningpolicyguidance/historicenvironment/pps9/

Supplementary Planning Guidance 2 Biodiversity Conservation SPG2;
http://www.kmsp.org.uk/


UK Biodiversity Action Plan www.ukbap.org.uk/

Vegetative Treatment Systems for Highway Runoff, Volume 4, Section 2;
Highways Agency

Veterans Tree Guide; English Nature;

1.3 Engineering references

Ashford Integrated Water Management Study; Environment Agency/Black and Veatch, 2005

Civil Engineering Specification for the Water Industry; 5th Edition; 1998; UKWIR.

Control of water pollution from construction sites, Guidance for consultants and contractors C532; 2001, CIRIA, London

Control of Water Pollution from linear construction projects, Technical Guidance C648; 2006, CIRIA, London.

Design and Analysis of Urban Storm Drainage Volume 1, Principles and Method, Wallingford Procedure.

Design Manual for Roads and Bridges, Hydraulic Design of Road Edge Surface Water Channels DMBR 4.2.1HA 37; Highways Agency.
Appendix 5: Useful Contacts

Design manual for roads and bridges; various including HA 103/06; HA 118/06; HA 119/06. Highways Agency.

Design of Flood Storage Reservoirs C14; 1993; CIRIA, London

Gravity Drainage Systems Inside Buildings installation and testing; 2000; BS EN 23056-5-2000; BSI.

Harvesting Rainwater for Domestic uses information guide; 2003; Environment Agency.

Health and safety advice and audit information is available from the Royal Society for the Prevention of Accidents;

http://www.rospa.com/


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Kent Design Guide; 2005/2006;

Measurement of liquid flow in open channels, guide to measurement of flow in tidal channels; 1995; BS 3680-6:1995; BSI

Measurement of liquid flow in open channels, guide to measurement of flow in tidal channels; 1995; BS 3680-6:1995; BSI;

Planning Policy Statement 25: Development and Flood Risk, 2006;

http://www.communities.gov.uk/planningandbuilding/planning/planningpolicyguidance/planningpolicystatements/planningpolicystatements/pps25


Review of the design and management of constructed wetlands report C180; 1997; CIRIA; London

Separator Systems for light liquids (e.g. Oil and petrol). Part 1: Principles of product design, performance and testing, marking and quality control; 2002; BS EN 858-1:2002; BSI
Appendix 5: Useful Contacts

Sewers for Adoption; 2006, Water UK/WRc plc

Soakway Design BRE 365; British Research Establishment; UK

Source control using constructed pervious surfaces, Hydraulic, structural and water quality issues C582; 2001; CIRIA, London


Specification for highways works; 1998a; Highways Agency, Series 300, Fencing.

Stour Catchment Management Abstraction Strategy (CAMS); 2003; Environment Agency,

Structural design of buried pipelines under various conditions of loading; 1998; BS EN 1295-1:1998; BSI

SUDS a guide for developers; 2003, Environment Agency,


Sustainable Drainage systems, hydraulic, structural and water quality advice C609; 2004, CIRIA, London


Sustainable Urban Drainage Systems, Best practice Manual for England, Scotland, Wales and North Ireland (C523); 2001; CIRIA; London

Sustainable water management in schools W012; CIRIA, London


Use and design of oil separators in surface water drainage systems, Environment Agency.

Working at Construction and Demolition sites; PPF6; Environment Agency;


Works in, near or liable to affect water courses; PPG5, Environment Agency;

Appendix 6: SuDS Checklist

ASHFORD BOROUGH COUNCIL

SUSTAINABLE DRAINAGE CHECKLIST

POLICY CS20 of the adopted Core Strategy requires that all development should include appropriate sustainable drainage systems (SuDS) for the disposal of surface water, in order to avoid any increase in flood risk or adverse impact on water quality. This policy is supported by the Sustainable Drainage Supplementary Planning Document (SPD).

This Checklist aims to help developers demonstrate compliance with CS20, and should be included with the Flood Risk Assessment.

SECTION 1 SITE DETAILS

1. PLANNING REF No: ........................................................................................................
2. SITE NAME: ....................................................................................................................
3. LOCATION (NGR): ........................................................................................................
4. TOTAL SIZE OF SITE (Note 1): ...........................................(Ha)
5. DEVELOPABLE AREA (Note 2) A=.........................................................(Ha)
6. PERCENTAGE IMPERMEABLE AREA ‘P’ (Note 3): …………………..(0 – 1.0)
7. CURRENT USE (Note 4) Greenfield / Brownfield / Mixed*
8. CATCHMENT (Note 4): Stour (North) / Stour (South) / Beult / Other* (please define) 
   …........................................
9. MAX REQUIRED RUN-OFF RATE [per unit area]* (Note 5): 2 4 6 11.4 other (define) ................. l/s/ha
10. MAX DISCHARGE (Note 6): ..................................................(l/s)

SECTION 2 ASSESSMENT OF STORAGE VOLUME REQUIRED

11. ATTENUATION STORAGE VOL [per unit area] (Note 7): ...............................m3/Ha
12. TOTAL STORAGE VOLUME REQUIRED (Note 8): .................................m3
SECTION 3 ASSESSMENT OF STORAGE VOLUME PROVIDED

13. STORAGE PROVIDED:……………………m³ made up as follows:

<table>
<thead>
<tr>
<th>Type</th>
<th>Volume to be provided</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green roof</td>
<td></td>
</tr>
<tr>
<td>Water butts</td>
<td></td>
</tr>
<tr>
<td>Rainwater harvesting</td>
<td></td>
</tr>
<tr>
<td>Soakaways / infiltration</td>
<td></td>
</tr>
<tr>
<td>Filter strips</td>
<td></td>
</tr>
<tr>
<td>Porous paving</td>
<td></td>
</tr>
<tr>
<td>Swales</td>
<td></td>
</tr>
<tr>
<td>Retention / Detention ponds</td>
<td></td>
</tr>
<tr>
<td>Underground tanks / over-size pipes</td>
<td></td>
</tr>
<tr>
<td>Other (please specify)</td>
<td></td>
</tr>
</tbody>
</table>

TOTAL

SECTION 4 DESCRIPTION

Brief description of SuDS design principles (management train, environmental considerations, evidence supporting ‘best endeavours’ approach):

Maintenance / Adoption requirements:

Any questions on this checklist should be directed to:

Name:……………………………………..

Contact details:……………………………………………………………………

Notes:

1. The size should be the total size of the site in hectares including large areas of greenspace. Note, large areas of public open space within the site can be used to accommodate SuDS features.
2. The developable area is the size of the site excluding large undeveloped areas being allocated as public open space which remain unmodified – i.e. not positively drained. The ‘developable area’ does include areas of greenspace (such as private gardens) that are incidental to the development.

3. The Percentage Impermeable (P) value is a reflection of the density of the development: nominally: Low Density = 0.5; Medium Density = 0.75; High Density = 1.0. The ‘P’ value can be further adjusted if it is proposed to use permeable paving and / or green roofs on the site. For instance, if it is proposed to use permeable paving extensively on an otherwise high density site it may be appropriate to use P = 0.8 or 0.9. For sites where the ‘P’ value is less than 0.5 (i.e. where pervious area is the main surface type) a more detailed study should be made as the storage estimates may be undersized. It is anticipated that most sites in Ashford will be high density, i.e. P = 1.0 and this is the default value.

4. The current use and the catchment are the parameters in Table 3.1 to determine the allowable run-off rate. If 2, 4, 6 or 11.4 l/s/ha are not used an estimation of greenfield / brownfield run-off will have to be calculated.

5. The maximum required run-off rate (2 / 4 / 6 / 11.4 l/s/ha) from Table 3.1.

6. The maximum discharge (total run-off) is the allowable run-off rate (from 10) multiplied by the developable area (from 5).

7. The attenuation storage volume per unit area from Table A.2 based on ‘P’ (from 7) & discharge (from 10). Note: this figure contains an allowance for climate change and siltation / vegetation.

8. The Total Storage Requirement is the attenuation storage volume (from 12) x the development area (from 5)