Cambridgeshire County Council

SURFACE WATER PLANNING GUIDANCE

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1 DOCUMENT PURPOSE

1.1 Introduction

1.1.1 A significant amount of new development will occur in Cambridgeshire over the next 20 years and beyond. In order to reduce the impact upon the water environment, development must be appropriately located, well designed, managed and take account of the impacts of climate change.

1.1.2 This guidance has been prepared to support developers and their consultants in the preparation of surface water documents to support planning applications.

1.1.3 This document is 'live' and will therefore be reviewed annually and updated should new guidance or legislation be introduced.

Photo 1: Attenuation basin at Loves Farm, St Neots

2 POLICY BACKGROUND AND LLFA ROLE

2.1 Statutory Consultee

2.1.1 The LLFA is a statutory consultee to the planning process for all **major developments**. Major development is defined as development involving any one or more of the following:

a) the winning and working of minerals or the use of land for mineral-working deposits;
b) waste development;
c) the provision of dwelling-houses where—
    i. the number of dwelling-houses to be provided is 10 or more; or
    ii. the development is to be carried out on a site having an area of 0.5 hectares or more and it is not known whether the development falls within sub-paragraph (c)(i).
d) the provision of a building or buildings where the floor space to be created by the development is 1,000 square metres or more; or
e) development carried out on a site having an area of 1 hectare or more.

2.1.2 As a statutory consultee we are required to provide a substantive response to any consultations we receive. A substantive response is one which:

a) states that the consultee has no comment to make;
b) states that, on the basis of the information available, the consultee is content with the development proposed;
c) refers the consultor to current standing advice by the consultee on the subject of the consultation; or
d) provides advice to the consultor.

2.1.3 The LLFA will endeavour to reply to statutory consultations within 21 days of being consulted.

2.2 National Planning Policy Framework

2.2.1 The National Planning Policy Framework (NPPF) acts as guidance for Local Planning Authorities and decision-makers about planning applications. Section 14 of this document contains key information on how flood risk and sustainable drainage systems (SuDS) should be considered as part of new development. All plans should apply a sequential, risk-based approach to the location of development taking into account all sources of flood risk and the current and future impacts of climate change so as to avoid, where possible, flood risk to people and property. The aim of the sequential test is to steer new development to areas with the lowest risk of flooding from any source. If it is not possible for development to be located in areas with a lower risk of flooding (taking into account wider sustainable development objectives), the exception test may have to be applied. The need for the exception test will depend on the potential vulnerability of the site and of the development proposed.

2.3 Planning Practice Guidance

2.3.1 The Planning Practice Guidance (PPG) has been produced to support the NPPF. Paragraph 057 of the PPG states, *'The types of sustainable drainage system which it may be appropriate to consider, will depend on the proposed development and its location, as well as any planning policies and guidance that apply locally. Where possible, preference should be given to multi-functional sustainable drainage systems, and to solutions that allow surface water to be discharged according to the following hierarchy of drainage options:*

1. *into the ground (infiltration);*
2. *to a surface water body;*
3. *to a surface water sewer, highways drain, or another drainage system;*
4. *to a combined sewer.'*

2.3.2 Paragraph 058 of the PPG states, *'The local planning authority should be satisfied that the minimum standards of operation for the proposed sustainable drainage system are appropriate, and that there are clear maintenance and adoption arrangements in place for the lifetime of the development. The local planning authority will need to consider whether the proposed standard of construction would facilitate adoption and maintenance by an appropriate body such as the water and sewerage company under the Ofwat-approved Sewerage Sector Guidance. Also refer to the non-statutory technical standards. The use of monitoring and operation technology as part of sustainable drainage systems could help to optimise their effectiveness and allow their operation to be adapted over time.'*

2.3.3 Paragraph 063 of the PPG states how sustainable drainage can reduce the causes and impact of flooding – *'A comprehensive sustainable drainage approach can help to alleviate flood risk as well as managing the impacts where flooding does occur, for example by:*

- *Maximising opportunities for infiltration of surface water through replacement of impermeable surfaces with permeable surfaces;*
- *Maximising opportunities for planting and vegetated areas, in preference to engineered surfaces, to increase evapo-transpiration and provide improvements for biodiversity and wider natural capital benefits;*
- *Providing additional surface water storage over and above the minimum requirements e.g. an over-sized pond, to accommodate more extreme rainfall events; and*
- *Reducing surface water loadings on the existing sewerage network. This could include using systems to capture run-off from surrounding development, not just the proposed development, by incorporating it into the provision of an area-wide strategic sustainable drainage system, planned in conjunction with local risk management authorities and sewerage providers. This approach could help reduce the risk of sewer flooding and free up capacity in wastewater treatment works, off-setting the need for off-site reinforcements of the sewerage network.'*

2.4 Cambridgeshire Flood & Water Supplementary Planning Document

2.4.1 The Cambridgeshire Flood & Water Supplementary Planning Document (SPD) has been prepared by Cambridgeshire County Council (as the LLFA) in conjunction with the other Cambridgeshire local planning authorities (LPAs) to provide guidance on the approach that should be taken to design new developments to manage and mitigate flood risk and include sustainable drainage systems (SuDS) see chapter 6.

The SPD has been adopted by all council's within Cambridgeshire. For the avoidance of doubt these are:

1. **South Cambridgeshire District Council**
2. **Fenland District Council**
3. **East Cambridgeshire District Council**
4. **Huntingdonshire District Council**
5. **Cambridge City Council**

2.5 District Council Local Plans

The SPD provides guidance on the implementation of flood and water related policies within each district council's respective Local Plan. Development must comply with the policies set out in their district's Local Plan. The flood and water related policies are set out below:

South Cambridgeshire District Council

Policy CC/7 required that:

In order to protect and enhance water quality, all development proposals must demonstrate that:

(a) There are adequate water supply, sewerage and land drainage systems (including water sources, water and waste water infrastructure) to serve the whole development, or an agreement with the relevant service provider to ensure the provision of the necessary infrastructure prior to the occupation of the development. Where development is being phased, each phase must demonstrate sufficient water supply and wastewater conveyance, treatment and discharge capacity;
(b) The quality of ground, surface or water bodies will not be harmed, and opportunities have been explored and taken for improvements to water quality, including renaturalisation of river morphology, and ecology;
(c) Appropriate consideration is given to sources of pollution, and appropriate Sustainable Drainage Systems (SuDS) measures incorporated to protect water quality from polluted surface water runoff.

Policy CC/8 requires that:

(a) Surface water drainage schemes comply with the Sustainable Drainage Systems: Non-statutory technical standards for sustainable drainage systems and the Cambridgeshire Flood and Water Supplementary Planning Document or successor documents;
(b) Opportunities have been taken to integrate sustainable drainage with the development, create amenity, enhance biodiversity, and contribute to a network of green (and blue) open space;
(c) Surface water is managed close to its source and on the surface where it practicable to do so;
(d) Maximum use has been made of low land take drainage measures, such as rain water recycling, green roofs, permeable surfaces and water butts;
(e) Appropriate pollution control measures have been incorporated, including multiple component treatment trains; and
(f) Arrangements have been established for the whole life management and maintenance of surface water drainage systems.

Policy CC/9 requires that:

In order to minimise flood risk, development will only be permitted where:

(a) The sequential test and exception tests established by the National Planning Policy Framework demonstrate the development is acceptable (where required);

(b) Floor levels are 300mm above the 1 in 100 year flood level plus and allowance for climate change where appropriate and where appropriate and practicable also 300mm above adjacent highway levels;
(c) Suitable flood protection/ mitigation measures are incorporated as appropriate to the level and nature of flood risk, which can be satisfactorily implemented to ensure safe occupation, access and egress. Management and maintenance plans will be required, including arrangements for adoption by any public authority or statutory undertaker and any other arrangements to secure the operation of the scheme throughout its lifetime;
(d) There should be no increase to flood risk elsewhere, and opportunities to reduce flood risk elsewhere have been explored and undertaken (where appropriate), including limiting discharge of surface water (post development volume and peak rate) to natural greenfield rates or lower, and;
(e) The destination of the discharge obeys the following priority order:
    i. Firstly, to the ground via infiltration;
    ii. Then, to a water body;
    iii. Then, to a surface water sewer;
    iv. Discharge to a foul water or combined sewer is unacceptable.

Cambridge City Council

Policy 31 requires that:

a) surface water is managed close to its source and on the surface where reasonably practicable to do so;
b) priority is given to the use of nature services;
c) water is seen as a resource and is re-used where practicable, offsetting potable water demand, and that a water sensitive approach is taken to the design of the development;
d) the features that manage surface water are commensurate with the design of the development in terms of size, form and materials and make an active contribution to making places for people;
e) surface water management features are multi-functional wherever possible in their land use;
f) any flat roof is a green or brown roof, providing that it is acceptable in terms of its context in the historic environment of Cambridge (see Policy 61: Conservation and Enhancement of Cambridge's Historic Environment) and the structural capacity of the roof if it is a refurbishment. Green or brown roofs should be widely used in large-scale new communities;
g) there is no discharge from the developed site for rainfall depths up to 5 mm of any rainfall event;
h) the run-off from all hard surfaces shall receive an appropriate level of treatment in accordance with Sustainable Drainage Systems guidelines, SUDS Manual (CIRIA C753), to minimise the risk of pollution;
i) development adjacent to a water body actively seeks to enhance the water body in terms of its hydro-morphology, biodiversity potential and setting;
j) watercourses are not culverted and any opportunity to remove culverts is taken; and
k) all hard surfaces are permeable surfaces where reasonably practicable, and having regard to groundwater protection.

Policy 32 requires that:

a) the peak rate of run-off over the lifetime of the development, allowing for climate change, is no greater for the developed site than it was for the undeveloped site;

b) the post-development volume of run-off, allowing for climate change over the development lifetime, is no greater than it would have been for the undeveloped site. If this cannot be achieved then the limiting discharge is 2 litre/s/ha for all events up to the 100-year return period event;

c) the development is designed so that the flooding of property in and adjacent to the development would not occur for a 1 in 100 year event, plus an allowance for climate change and in the event of local drainage system failure;

d) the discharge locations have the capacity to receive all foul and surface water flows from the development, including discharge by infiltration, into water bodies and into sewers;

e) there is a management and maintenance plan for the lifetime of the development, which shall include the arrangements for adoption by any public authority or statutory undertaker and any other arrangements to secure the operation of the scheme throughout its lifetime; and

f) the destination of the discharge obeys the following priority order:

- firstly, to ground via infiltration;
- then, to a water body;
- then, to a surface water sewer.

Discharge to a foul water or combined sewer is unacceptable.

Huntingdonshire District Council

LP 15 requires that:

a) The proposal incorporates sustainable drainage systems (SuDS) in accordance with the Cambridgeshire Flood and Water Supplementary Planning Document (SPD) or successor documents and advice from Cambridgeshire County Council as Lead Local Flood Authority, unless demonstrated to be inappropriate;

b) Provisions are put in place to ensure that SuDS will be maintained;

c) If the drainage system would directly or indirectly involve discharge to a watercourse that the Environment Agency are responsible for the details of the discharge have been agreed with them;

d) If a road would be affected by the drainage system the details have been agreed with the relevant Highway Authority;

e) If the drainage system would discharge water to systems controlled by the Middle Level Commissioners or an internal drainage board their standing advice or guidance has been taken into account and the details of the discharge have been agreed with them;

f) if the drainage system would directly or indirectly involve discharge to the River Great Ouse the incorporation of water retaining features as part of the drainage system has been prioritised; and

g) There is no adverse impact on, or unacceptable risk to, the quantity or quality of water resources or on meeting the objectives of the Water Framework Directive and the Habitats Directive.

SuDS for hard-standing areas for parking of 50 or more cars, or equivalent areas will be expected to include appropriate additional treatment stages/ interceptors to ensure that any pollution risks are suitably addressed.

In order to safeguard against the pollution of ground water the use of deep infiltration SuDS, such as deep borehole soakaways, will not be accepted in most circumstances. Exemptions will only be made in exceptional circumstances if the proposal is for land uses that pose a very low pollution risk and are supported by an adequate risk assessment, conceptual site model and detailed design.

Fenland District Council

LP14 (Part B) requires that:

All development proposals should adopt a sequential approach to flood risk from all forms of flooding. Development in areas known to be at risk from any form of flooding will only be permitted following:

a) the successful completion of a sequential test (if necessary), having regard to 66 actual and residual flood risks
b) an exception test (if necessary)
c) the suitable demonstration of meeting an identified need
d) through the submission of a site specific flood risk assessment, demonstrating appropriate flood risk management and safety measures and a positive approach to reducing flood risk overall, and without reliance on emergency services.

In addition to the requirements of the NPPF and associated technical guide, all applications for relevant developments must include a drainage strategy to demonstrate that:

a) suitable consideration has been given to surface water drainage;
b) appropriate arrangements for attenuating surface water run-off can be accommodated within the site; and
c) issues of ownership and maintenance are addressed. For foul drainage private infrastructure managed by residents groups or management companies should be avoided.

The use of Sustainable Drainage Systems (SuDS) will be required to ensure that runoff from the site (post development) is to Greenfield runoff rates for all previously undeveloped sites and for developed sites (where feasible). This should include sufficient area within the site to accommodate SuDS for the short term management of surface water drainage and where appropriate link to green / blue infrastructure to exploit opportunities for biodiversity, environmental, heritage, social and recreational enhancement and value. Schemes should complement the aims of the Cambridgeshire Green Infrastructure Strategy but should be retained and maintained primarily for the purpose for which they were designed, whilst being sensitive to the multi–functional benefits they can provide.

The most appropriate SuDS techniques should be used depending on the particular circumstances of the site and area. Consideration should be given to the facility to be used, what is trying to be achieved, and the nature of water level management in the area.

The discharge of surface water from developments should be designed to contribute to an improvement in water quality in the receiving water course or aquifer in accordance with the objectives of the Water Framework Directive.

All proposals should have regard to the guidance and byelaws of the relevant Internal Drainage Board, including, where appropriate the Middle Level Strategic Study and should help achieve the flood management goals from the River Nene and Great Ouse Catchment Flood Management Plans.

A Supplementary Planning Document informed by up-to-date national and local evidence and to be adopted in 2014 will be used to further assess planning applications on flood risk and drainage matters.

East Cambridgeshire District Council

ENV 8 requires that:

All developments and re-developments should contribute to an overall flood risk reduction.

The sequential test and exception test will be strictly applied across the district, and new development should normally be located in Flood Risk Zone 1. The modelled flood risk zones as identified in the SFRA and the Environment Agency Flood Maps will inform the application of the sequential test. Development will not be permitted where:

- It would intensify the risk of flooding during the lifetime of the development taking into account climate change allowances, unless suitable flood management and mitigation measures can be agreed and implemented.
- It would increase the risk of flooding of properties elsewhere during the lifetime of the development, taking into account climate change allowances, by additional surface water run-off or by impeding the flow or storage of flood water.
- It would have a detrimental effect on existing flood defences or inhibit flood control and maintenance work.
- The risk of flooding would cause an unacceptable risk to safety; or
- Safe access is not achievable from/to the development during times of flooding, taking into account climate change allowance.

A site-specific Flood Risk Assessment, endorsed by the Environment Agency, appropriate to the scale and nature of the development and the risks involved, and which takes account of future climate change, will be required for:

- Major and non-minor development proposals in Flood Zones 2 and 3 and 'Modelled Zone 3'; and
- Major and non-minor development proposals in Flood Zone 1, on sites of 1 hectare or greater, or where there is evidence of historic flooding set out in the SFRA and/or a Surface Water Management Plan.

All applications for new development must demonstrate that appropriate surface water drainage arrangements for dealing with surface water run-off can be accommodated within the site, and that issues of ownership and maintenance are addressed.

The use of Sustainable Drainage Systems will be required for new developments in accordance with the Cambridgeshire SuDS Design and Adoption Handbook (or successor document) unless, following an assessment of character and context, soil conditions and/or engineering feasibility dictate otherwise. SuDS may be incorporated within the Flood Risk Assessment.

3 PRE-APPLICATION DISCUSSIONS

3.1 Introduction

3.1.1 As LLFA we offer a pre-application service for all scales of development. The aim of pre-application discussions is to guide developers through the planning process to ensure high quality developments can be delivered across Cambridgeshire. The service is structured to provide 'in principle' feedback on your proposals as well as more detailed discussions and negotiations on a scheme prior to formal submission as a planning application.

3.2 Types of Pre-application Discussions

3.2.1 We understand that the type of advice required for each development may differ; therefore we offer three options:

Free 15 minute advice service

This is suitable for all stages of application, which consists of a 15 minute call with one of our officers to discuss surface water drainage proposals. We will be able to discuss pre-application proposals as well as drainage enquiries for existing applications. Please email FR.Planning@Cambridgeshire.gov.uk to book your time slot, using the email subject header 'Free Telephone Advice Service' and attach any plans or documents that you would like to discuss.

Written advice only

This is most suitable for those developers who have already advanced quite far with their drainage strategies and are looking for a review of their proposals. We will undertake a full review of any submitted documents and provide detailed comments within 14 days of instruction.

Online OR Face-to-face meeting with LLFA officer with follow-up written advice

This is most suitable for those developers who have ideas about how to approach their drainage strategy but who would like to discuss the detail with an LLFA officer. The benefit of this service is that discussions can take place and agreements in principle can be reached following detailed discussions of proposals.

Further details on the pre-application charges can be found on our website. Flood and water - Cambridgeshire County Council

3.3 Using the Pre-Application Service

3.3.1 If you wish to take up our pre-application service please use our online application form where you will be required to outline the following details:

a. Type of pre-application service required
b. Type, scale and location of development
c. Contact details

3.3.2 An officer from the LLFA will respond to your enquiry and make appropriate arrangements.

4 FORMAL SUBMISSION REQUIREMENTS

4.1 Introduction

4.1.1 To enable the LLFA to provide its response as a statutory consultee the developer should produce a surface water drainage strategy for the proposed development that includes the level of information corresponding to the type of application submitted.

4.1.2 We have produced a series of checklists in the following sections which provide a summary of the expected level of information. Further information may be requested to support the application where there are complex local issues. This information will draw on other information contained within the planning application but is required by the LLFA to ensure the standard of surface water management is appropriate.

4.1.3 Working from these checklists will help developers to ensure the LLFA does not object to the application on the grounds of lack of information. If, during the preparation of a surface water drainage strategy you have any questions about the required information then please do not hesitate to contact us at fr.planning@cambridgeshire.gov.uk. Contacting the LLFA during the early stages to clarify any issues will also help reduce the likelihood of an objection.

4.2 Outline Applications

4.2.1 Further detail has been provided on some items within this table. They are provided later in the document or can be accessed by clicking on the hyperlinks.

	Outline	(ü)
1	Type of development (e.g. new development, extension to existing development, change of use)	
2	Status of site (i.e. greenfield or previously developed)	
3	Total site area (ha)	
4	Existing impermeable area (ha)	
5	Proposed impermeable area / developable area (ha) (including an allowance for urban creep)	
6	Description of site topography	
7	Identification of watercourses within vicinity of site and their outfalls and associated flood risk	
8	Description of ground conditions (using site investigation reports where available) including information regarding geology and groundwater depth	
9	Identification of any surface water flood risk	
10	Existing site drainage arrangements	
11	Proposed method of surface water disposal (using drainage hierarchy) & supporting evidence	
12	Existing runoff rates (l/s/ha)	
13	Proposed runoff rates (l/s/ha)	
14	Existing runoff volumes (m^3/ha)	
15	Proposed runoff volumes (m^3/ha)	
16	Required volume of attenuation (m^3 per m^2 of impermeable area)	
17	Appropriate consideration of climate change	
18	Preliminary SuDS proposals (type, location, size)	
19	Infiltration test results in accordance with BRE365 (if proposing infiltration) **or** second viable option for surface water disposal if testing has not been undertaken	
20	Water Quality	
21	Evidence of in principle agreement from third party if discharging into their system	

22	Preliminary site layout plans (including SuDS features)	
23	Details of proposed phasing (if applicable) and how each phase will be delivered in relation to the strategic surface water drainage strategy	

4.3 Full Applications

4.3.1 Further detail has been provided on some items within this table. They are provided later in the document or can be accessed by clicking on the hyperlinks.

	Full	(ü)
1	Type of development (e.g. new development, extension to existing development, change of use etc.)	
2	Status of site (i.e. greenfield or previously developed)	
3	Total site area (ha)	
4	Existing impermeable area (ha)	
5	Proposed impermeable area / developable area (ha) (including an allowance for urban creep)	
6	Description of site topography	
7	Identification of watercourses within vicinity of site and their outfalls and associated flood risk	
8	Description of ground conditions (using site investigation reports where available) including information regarding geology and groundwater depth	
9	Identification of any surface water flood risk & proposed mitigation	
10	Existing site drainage arrangements	
11	Proposed method of surface water disposal (using drainage hierarchy) & supporting evidence	
12	Existing runoff rates (l/s/ha)	
13	Proposed runoff rates (l/s/ha)	
14	Existing runoff volumes (m^3/ha)	
15	Proposed runoff volumes (m^3/ha)	
16	Total required volume of attenuation (m^3)	
17	Appropriate consideration of climate change	
18	SuDS proposals (type, location, size)	
19	Infiltration test results in accordance with BRE365 (if proposing infiltration) **or** second viable option for surface water disposal if testing has not been undertaken	

20	Water Quality	
21	Finished Floor Levels	
22	Evidence of in principle agreement from third party if discharging into their system	
23	Drainage layout drawing & supporting hydraulic calculations	
24	Management/maintenance plan and on-going maintenance responsibilities	
25	Site layout plans	

4.4 Reserved Matters

4.4.1 Further detail has been provided on some items within this table. They are provided later in the document or can be accessed by clicking on the hyperlinks.

	Reserved Matters	(ü)
1	Detailed drainage layout (confirming layout, scale, size, and appearance)	
2	Proposed impermeable area (ha)	
3	Proposed method of surface water disposal	
4	Hydraulic calculations to show performance of the system in the 3.3% AEP and 1% AEP plus climate change storm event	

4.5 Discharge of Condition

4.5.1 The wording of surface water conditions may vary between local planning authorities as they are not obliged to use the wording we suggest within our consultation responses. However the checklist below should provide the majority of what we would require to discharge most surface water conditions:

4.5.2 Further detail has been provided on some items within this table. They are provided later in the document or can be accessed by clicking on the hyperlinks.

4.5.3 When submitting any discharged of condition application, please ensure that the approved drainage strategy for the wider site is included within the submission.

	Discharge of Condition	(ü)
1	Detailed drainage layout	
2	Proposed impermeable area (ha)	
3	Proposed method of surface water disposal (using drainage hierarchy) & evidence to support this	
4	Proposed runoff rates (l/s/ha)	
5	Proposed runoff volumes (m^3/ha)	
6	Total required volume of attenuation (m^3)	
7	Detailed SuDS proposals (type, location, size)	
8	Infiltration test results in accordance with BRE365 (if proposing infiltration)	
9	Details of proposed flow controls (type, size)	
10	Hydraulic calculations to show performance of the system up to the 1% AEP plus climate change storm event	
11	Exceedance flow plan	
12	Water Quality	
13	Finished Floor Levels	
14	Management / maintenance arrangements (including adopting body)	
15	Formal agreement from third party if discharging into their system	

5 TECHNICAL GUIDANCE

5.1 Introduction

5.1.1 The following sections provide technical guidance on the aspects contained within the checklists in the preceding chapter. This is aimed at providing developers and their consultants with locally specific technical guidance to ensure their submissions are aligned with the expectations of the LLFA.

5.2 Urban Creep

5.2.1 Urban creep should be considered in any application to account for increases in impermeable surfaces throughout the lifetime of development (e.g. the addition of conservatories or building extensions). This should be limited to residential development only and use the allowances shown in **Error! Reference source not found.**.

Table 1: Urban Creep Allowances

Residential development density (dwellings per hectare)	Change allowance (% of impermeable area)
≤25	10
30	8
35	6
45	4
≥50	2
Flats and apartments	0

5.3 Existing Site Drainage Arrangements

Greenfield sites

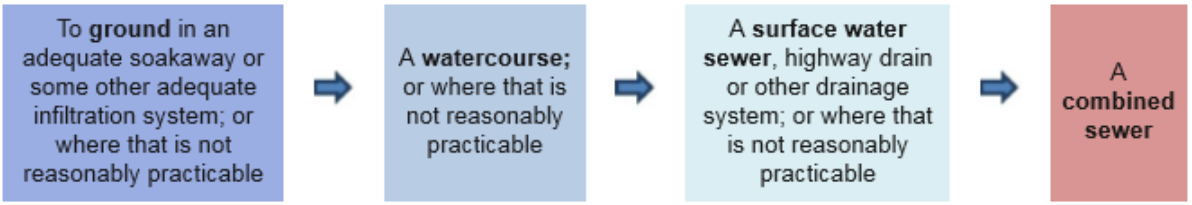
5.3.1 Detail should be provided on the natural contours of the land, flow paths and existing points of discharge. If there are multiple catchments within the site, these should be identified and retained following development unless it can be demonstrated that the alteration of catchments will provide betterment.

Previously developed sites

5.3.2 As much detail as possible should be provided on the existing positive drainage system (if present). However as a minimum, details of the final outfall including its location, destination and condition must be provided. If the site discharges into a third party asset such as an IDB drain under non-standard conditions (e.g. a higher rate of discharge), agreements outlining this should be provided within the report.

5.4 Proposed Method(s) of Surface Water Disposal

5.4.1 As required by the Building Regulations and PPG, the re-use of surface water must be considered ahead of disposal off-site. If re-use is not possible, surface water must discharge to the following, listed in order of priority:



5.4.2 There will be a presumption against connections into existing highway drainage systems unless sufficient evidence is provided that the highway drainage system has capacity or that improvements can be made to accommodate any additional **highway** surface water run-off the proposed development generates. Private surface water will not be allowed to discharge into a highway drainage system under any circumstance **or** unless under exceptional circumstances as determined by the Local Highway Authority.

Infiltration

5.4.3 For an **outline** application, whilst we would prefer to receive infiltration test results, we appreciate that it is not always possible to undertake these and therefore we would accept a thorough desk-based assessment provided that a second viable option for surface water drainage is also proposed (e.g. to an adjacent watercourse) and presented in the application.

5.4.4 When submitting a **full** application or discharging a surface water condition and infiltration is proposed, infiltration testing in accordance with BRE365 must be undertaken at representative locations and depths across the proposed development site. The results of infiltration testing will need to be submitted alongside the application for review. The minimum infiltration rate the LLFA accepts is 1.0×10^{-6} m/s. To protect groundwater from pollution, any infiltration structure must be shown to be constructed with the base set at a minimum of 1.2 m above the anticipated groundwater level. Information to support this could include trial pits or boreholes on site. Where trial pits or boreholes find groundwater to be within 1.2 m of the ground level, groundwater monitoring should take place to measure fluctuations.

5.4.5 It is our view that deep soakaways (> 2 m below ground) or borehole soakaways do not meet the requirements of the first level of the hierarchy. Whilst in some cases they can provide important groundwater recharge, they do not mimic the natural drainage system as would shallow infiltration. These should only be considered as a final option for the disposal of surface water on a par with a sewer. If deep infiltration is the only feasible way to discharge surface water, we would expect the applicant to provide evidence they have agreed the strategy with the Environment Agency's groundwater team.

5.4.6 Infiltration through made ground should be avoided as this generates a potential risk of contamination to receiving groundwater bodies. Any made ground should be removed from beneath infiltration SuDS where possible. Infiltration through made ground will only be accepted if site investigations demonstrate the absence of contamination. To that effect, we would expect samples of made ground to be tested for potential contaminants of concern and the risks to controlled waters to be appropriately assessed. For example, leachate testing would allow a comparison against a suitable water quality standard. We would expect a suitably qualified consultant to be capable of undertaking the assessment to ensure that the development / they do not cause pollution of controlled waters.

Watercourse

5.4.7 If it is proposed to discharge into a watercourse within the site boundary this should be shown on a plan. We will require evidence that the watercourse itself has an outfall and is in a suitable condition to receive surface water:

- Photographs at appropriate intervals along the watercourse should be provided to determine the condition of the watercourse.
- An approximate assessment of channel capacity based on its dimensions could be undertaken to determine the capacity of the watercourse. As a worst-case scenario, the smallest part of the watercourse should be assessed.
- Evidence of a final effective outfall can include desktop traces to show the physical presence of the watercourse.

5.4.8 The lack of detailed information on these grounds may increase the level of uncertainty we have about the effectiveness of a drainage strategy. If this degree of uncertainty is great then as LLFA we would have grounds to object to the drainage proposal.

5.4.9 If the site discharges into a third-party asset such as an IDB drain under non-standard conditions (e.g. a higher rate of discharge), agreements outlining this should be provided before we are able to approve the proposal.

5.4.10 Appendix B provides a list of information sources relating to potential ownership/management of watercourses.

Surface Water Sewer

5.4.11 Any proposed connection to the public sewer will need agreement from Anglian Water. In the absence of a drainage survey, no assumption should be made that a previously developed site has a connection into a sewer and therefore the planning application must be assessed as if there is no existing connection and an agreement from Anglian Water is still required. For an outline application, correspondence with the responsible body should be submitted to demonstrate agreement in principle to the discharge and connection point. Anglian Water may require local capacity improvements for sewer connections or a new sewer may need to be requisitioned to connect to the best point on the network. These should be negotiated with the sewerage undertaker directly.

5.4.12 For any application, correspondence with the responsible body agreeing to accept surface water at an agreed rate should be appended to the surface water drainage strategy.

5.4.13 For connections into highway drains, surface water may only be drained into the network through existing proven connections. Alternatively, the developer may upgrade the highway drainage system from the site to the outfall point to allow sufficient capacity (with agreement from the highway authority).

5.4.14 Connections into any existing private sewer network require the location, condition and proof of a positive connection to either the public surface water sewer or an ordinary watercourse. Evidence should include a CCTV survey accompanied by existing network drawings.

Combined Sewer

5.4.15 Where a surface water connection to an existing combined sewer is unavoidable, it must be undertaken in such a manner and at such a location so as to facilitate future separation of the surface water from that combined system. As outlined above, for any application, correspondence with the responsible body should be submitted to demonstrate agreement in principle to the discharge and connection point. Anglian Water may require local capacity improvements for sewer connections or a new sewer may need to be requisitioned to connect to the best point on the network. These should be negotiated with the sewerage undertaker directly.

5.4.16 Surface water connections to foul sewers is not acceptable. Foul sewer is not formally on the drainage hierarchy and therefore the LLFA does not accept new connections to these networks.

5.5 Existing Runoff Rates

5.5.1 We require calculations of the existing peak runoff rates (l/s/ha) for the following storm events:

- 100% Annual Exceedance Probability (AEP) (1 in 1)
- 3.3% AEP (1 in 30)
- 1% AEP (1 in 100)

5.5.2 Consideration should be given to sub-catchments that may exist on site and individual calculations should be provided per sub-catchment where appropriate.

5.6 Proposed Runoff Rates

5.6.1 We require the rate of runoff from a development to be restricted in line with the SuDS Non-Statutory Technical Standards.

5.6.2 As outlined in Section 6.3.6 of the SPD, all new developments on greenfield land are required to discharge the runoff from the impermeable areas at the same greenfield runoff rate, or less than, if locally agreed with an appropriate authority or as detailed within the local planning policies of district and city councils. Where a **simple** flow control is proposed, the peak runoff rate should be limited to Q_{BAR} (mean annual flow rate).

Where a **complex** flow control is proposed the peak runoff rate from the developed site for events up to and including the 1% AEP plus climate change event should not exceed the greenfield equivalents.

5.6.3 Brownfield (previously developed land) sites must reduce the existing runoff from the site as part of the redevelopment. In order to provide betterment, redevelopments should look to reinstate greenfield runoff rates.

5.6.4 **IMPORTANT:** Where debris can enter the control (e.g. where the upstream system is open or where the inlets are gullies), static controls should have a minimum opening size of 100 mm for adopted systems (or 75mm for private systems) unless appropriate pre-treatment is provided. Where the design of the upstream system will prevent debris entering the system (e.g. underground systems where the inlets are pervious pavement systems or underdrained swales), static controls should have a minimum opening size of 50 mm for adopted systems (or 20mm for private systems). Variable controls may have a smaller opening provided they have a self-cleansing mechanism. The outlet diameter and associated risk of blockage should be considered on a site by site basis.

5.6.5 **NOTE:** Self cleansing velocity should be achieved for all pipes.

5.7 Existing Runoff Volumes

5.7.1 We require calculations of the existing peak runoff volumes (m^3/ha) for the following storm events using FEH rainfall data:

- 100% Annual Exceedance Probability (AEP) (1 in 1)
- 3.3% AEP (1 in 30)
- 1% AEP (1 in 100)

5.8 Proposed Runoff Volumes

5.8.1 Runoff volumes from the developed site will usually increase in comparison to the site in its natural condition; this may increase flood risk in natural receiving systems. Controlling the volume of runoff from the site is therefore vital to prevent flood risk in natural systems.

5.8.2 The volume should, where reasonably practicable be controlled, in accordance with the following.

5.8.3 **Greenfield Sites:** The runoff volume from the development site to any surface water body or sewer in the 1% AEP (1 in 100), 6 hour rainfall event should not exceed the greenfield runoff volume for the same event.

5.8.4 **Previously Developed Sites:** The runoff volume from the development site to any surface water body or sewer in the 1% AEP (1 in 100), 6 hour rainfall event must be constrained to a value as close to the greenfield runoff volume for the same event, but should never exceed the runoff volume from the existing site. Where it is not reasonably practicable to constrain the volume of runoff, the runoff volume must be discharged at a rate that does not adversely affect flood risk.

5.8.5 To achieve the above, long term storage may be required. Long Term Storage is the term given to the volume of temporary storage which needs to be provided for the additional volume of surface water runoff that is generated by the development that is greater than the volume of greenfield runoff. The greenfield runoff volume is calculated using the 1:100 year 6 hour event. This volume is the amount that can be discharged at the 1:100 year greenfield runoff rate. The additional runoff volume should be discharged from the site at a flow rate less than 2 l/s/ha for this event.

5.9 Required Volume of Attenuation

5.9.1 An assessment of the volume of attenuation storage on site is required. This should be based on the 1% AEP plus climate change storm event and allowable discharge rate for the site. The method and volumes of attenuation should be identified and located on a plan of the proposed development.

5.9.2 Expressing volumes in a comprehensible format such as m^3 per m^2 of developed site area for an outline application makes the approach to design more flexible and simplifies the evaluation process.

5.9.3 Areas where water accumulates during storm events, such as attenuation basins, ponds and swales, should be counted as part of the positively drained catchment. As these structures start to fill, the rain falling on the water surface contributes to the overall volume of storage required.

5.10Climate Change

5.10.1 All surface water drainage strategies are expected to incorporate the latest climate change allowances for rainfall intensity for the 3.3% and 1% AEP storm events based on the relevant catchment, in accordance with the GOV.UK Peak Rainfall Allowances Map . The following six catchments cover the Cambridgeshire County Council boundary:

- Cam and Ely Ouse Management Catchment
- Combined Essex Management Catchment
- Nene Management Catchment

- North West Norfolk Management Catchment
- Old Bedford and Middle Level Management Catchment
- Upper and Bedford Ouse Management Catchment

5.10.2 All developments should use the upper end to assess the potential flood risk implications in the design rainfall event including whether there is any increased flood risk to third parties as a result of the development.

5.10.3 Where the lower climate change values are used, justification of the design life of the development should be provided to ensure that the correct climate change allowances are applied.

5.11SuDS Proposals

5.11.1 Surface water drainage systems should replicate natural drainage processes as closely as possible. SuDS such as permeable paving, swales, green roofs, attenuation basins and wetlands should be preferred on all development sites ahead of conventional piped drainage measures. Source control is required on all sites, in line with section 6.3.7 of the Cambridgeshire Flood and Water Supplementary Planning Document (SPD). Source control assists in mimicking the natural runoff from the site and provides the first stage of the SuDS Management Train, intercepting surface water at a localised level. As source control can be in the form of bioretention, rain gardens, over paved areas (permeable paving) and on roofs (green roofs) it is possible to fit this in every development around the hard landscaping without taking up much space. Geocellular storage crates can be considered an element of SuDS, however without other components (swales, filter drains or strips) they do not provide any water quality treatment.

5.11.2 Full design details of all SuDS features are contained within the CIRIA SuDS Manual (C753); however for ease, we have included some of the key design criteria (taken from the CIRIA SuDS Manual (C753)) that should be applied for the main SuDS features, in the following boxes.

Infiltration Systems

- Effective upstream pre-treatment required to remove sediment and silt loads to prevent long-term clogging
- A minimum infiltration rate of 1 x 10^{-6} m/s
- A minimum distance of 1.2 m between the base of the infiltration system and the maximum likely groundwater level
- Side slopes of infiltration basins should not normally be any steeper than 1 in 3 to allow for vegetative stabilisation, mowing, access and for public safety. However this may be relaxed if the basin is very shallow (e.g. less than 500 mm deep)
- Discharge from full to half full should be within a reasonable time (24 hours for anything up to the 3.3% AEP event plus climate change) so the risk of it not being able to manage a subsequent rainfall event is minimised. Where it is not possible to achieve a half drain time of 24 hours, it must be demonstrated that the system has capacity to accommodate an immediate and subsequent 10% AEP (1 in 10 year) rainfall event following a 3.3.% (1 in 30 year) rainfall event plus climate change
- Single point Infiltration features must be located no less than 5 metres from any building or road, or no less than 10 metres when used in areas of chalk. Features should also be positioned a minimum of 10 metres from any watercourse.

Filter Strips

- Contributing area should have a shallow slope that falls towards the filter strip
- Minimum longitudinal slope of 1% to prevent ponding and a maximum slope of 5% to prevent flow channelling. Level spreaders to be used where slopes are >5%
- Maximum flows across filter strip of 1.5 m/s recommended to prevent erosion

Permeable Paving

The design of permeable paving can vary significantly depending on the proposed use of the surface. Guidance should be sought from the manufacturer of the chosen permeable paving.

Wetlands

- Should include a sediment forebay, a permanent pool, attenuation storage volume and aquatic benching
- Inlets and outlets placed to maximise flow through the facility
- Maximum depth of permanent pool should be a maximum of 1.2 m
- Maximum depth of attenuation storage should be 0.5 m above the permanent pool
- An aquatic bench should extend inwards from the normal pond edge with a maximum depth of 0.4 m below the normal pool water surface elevation

Swales

- Should generally be designed with a trapezoidal or parabolic cross-section
- Base width should be between 0.5 – 2.0 m. For swale widths >2.0 m flow dividers may be required
- Longitudinal slopes should be constrained to 0.5-6% with check dams on slopes greater than 3%
- Underdrains required for swales with a slope >1.5% (unless wet swales proposed)
- A maximum side slope of 1 in 3 but 1 in 4 is preferred
- Minimum length of swale between culverts should be 5 m
- Normal swale depth of 400-600 mm
- Flow velocities kept below 1.0 m/s to prevent erosion

Attenuation/Detention Basins

- Effective upstream pre-treatment required to remove sediment and silt loads to prevent long-term clogging or alternatively a forebay should be incorporated
- Maximum depth of water should not exceed 2 m in most extreme design event but a much lower maximum depth is desirable
- Base of basin should have a gentle slope (no more than 1 in 100) towards the outlet
- Recommended length/width ratio for on-line basins is between 3:1 and 5:1
- Side slopes should not exceed 1 in 3 unless special site and/or safety arrangements allow for steeper slopes
- Discharge from full to half full should be within a reasonable time (24 hours for anything up to the 3.3% AEP event plus climate change) so the risk of it not being able to manage a subsequent rainfall event is minimised. Where it is not possible to achieve a half drain time of 24 hours, it must be demonstrated that the system has capacity to accommodate an immediate and subsequent 10% AEP (1 in 10 year) rainfall event following a 3.3.% (1 in 30 year) rainfall event plus climate change

5.12Infiltration Test Results

5.12.1 Infiltration testing to support the surface water drainage strategy will need to be undertaken in accordance with BRE365 guidance. The following provides good practice minimum requirements:

1. Minimum of 3 tests undertaken in quick succession at each location/trial pit
2. Lowest value obtained across the site to be used for calculating the required volume of soakaways
3. Depth of testing to be representative of drainage proposals (i.e. shallower tests for permeable paving and deeper tests for conventional soakaways)

5.12.2 The minimum infiltration rate the LLFA accepts is 1.0 x 10^{-6} m/s. **Please note that extrapolated results will not be accepted.**

5.12.3 Peak seasonal groundwater levels should be recorded during test pit excavations to demonstrate that the minimum distance of 1.2 m between the base of the infiltration system and the maximum likely groundwater level can be achieved. Due to fluctuations in groundwater levels as a result of seasonal changes, we request that wherever possible, infiltration testing is undertaken during or immediately following the winter months.

5.13Detailed Drainage Layout Plan

5.13.1 A detailed drainage layout plan should be fully labelled and show details (e.g. pipe numbers, cross-sections, water levels, gradients, diameters, locations and manhole details) of every element of the proposed drainage system (including all SuDS and pipes). If applicable, a maintenance buffer should be included in the layout plan.

5.14Details of Flow Controls

5.14.1 Details of the type and size of any flow controls (online or offline) should be included either with the report or on the detailed drainage layout plan.

5.14.2 Where the design of the upstream system will prevent debris entering the system (e.g. permeable paving or under-drained swales), flow controls can be as low as 20 mm in private systems (50mm for systems proposed for adoption), otherwise a minimum diameter of 75mm is required (or 100mm for adopted systems).

5.15Hydraulic Calculations

5.15.1 Calculations to show the performance of the system for a range of summer and winter storm durations from 15 minutes up to the 10080 minute (7 day) should be undertaken. **For storm durations less than 1 hour, Flood Studies Report (FSR) rainfall data should be used. For storm durations greater than 1 hour, Flood Estimation Handbook (FEH) rainfall data should be used.** FEH data must be used in these longer duration storms as it uses more up to data rainfall data and is more accurate for the purpose of modelling the future storm events over other data sources such as FSR for the larger duration storms. The FEH22 rainfall model supersede the FEH99 and FEH13 models. FEH22 is a major update of the previous FEH13, which now incorporates revised data, methods, and software. Whilst FEH13 is acceptable, FEH22 is preferred.

5.15.2 Full network hydraulic calculations are required for a suitable review of the proposed system. These should show the full pipe network and results for the 100%, 3.3% and 1% Annual Exceedance Probability (AEP) storm events.

5.15.3 For the critical 100% and 50% AEP rainfall events there should be no surcharging of the system, with the exception of any proposed flow control device/s.

5.15.4 For the critical 3.3% AEP rainfall event including an allowance for climate change, there should be no above ground flooding.

5.15.5 For the 1% AEP rainfall event including an allowance for climate change some short term above ground flooding may be permitted. It should be demonstrated that flood water is below 300 mm from the buildings finished floor levels and does not disrupt emergency access routes.

5.15.6 In line with best practice self-cleansing pipe velocities should be 1.0m/s with a minimum acceptable self-cleansing velocity of 0.75m/s to avoid the risk of blockages.

5.15.7 The MADD Factor should be set to 0 to avoid underestimating volumes entering the drainage network. Default settings assume that surface water is lost or stored elsewhere on site before entering the drainage network. A conservative approach should be taken to ensure that the proposed development provides the maximum level of storage for all rainfall events.

5.15.8 As hydraulic modelling is for the proposed impermeable areas across the site, Cv values should be set to 1 to account for the total runoff during storm events. Cv values of 0.84 and 0.75 for winter and summer storms respectively were justified in a paper in the 1990s based on the original runoff model in the Wallingford Procedure which was issued in 1983. This has since shown to under-predict runoff for large rainfall events and has therefore been rendered obsolete.

5.15.9 Lowest mass balance values should be >99%. Lower values indicate that the network calculations are not accounting for all of the surface water entering the system, which could indicate an unstable simulation.

5.15.10 The drain down time should be set to 1440 minutes (1 day) minimum to ensure the risk of it not being able to manage a subsequent rainfall event is minimised. If it is not possible to do this, evidence that the feature is capable of storing a subsequent 1 in 10-year event is required.

5.15.11 Porosity value of 1.0 appropriate for empty basins. Cellular storage structures should use 0.95. Structures with permeable back fill should use 0.3.

5.15.12 The standard default setting of many surface water computer modelling programmes assumes a freely discharging outfall. Careful consideration is required and evidence provided to demonstrate that this assumption is correct. In many circumstances an outfall maybe surcharged affecting its hydraulic capacity and impacting on the surface water network. A surcharged outfall is likely to occur if discharging into a watercourse or surface water network near capacity. In these scenarios, and with the absence of supporting information to the contrary, it is expected the surface water calculations will assume a surcharged outfall.

5.15.13 Infiltration coefficient should bet set to zero unless infiltration system is proposed. The following minimum factors of safety should be used in calculations for infiltration systems:

Size of area to be drained	Consequence of failure		
	No damage or inconvenience	Minor damage to external areas or inconvenience (e.g. surface water on car parking)	Damage to buildings or structures, or major inconvenience (e.g. flooding of roads)
< 100 m^2	1.5	2	10
100-1000 m^2	1.5	3	10
> 1000 m^2	1.5	5	10

5.16Exceedance Flow Plan

5.16.1 If any above ground flooding is expected for the 1% AEP (1 in 100) rainfall event including an allowance for climate change, a plan showing the volumes, depths, velocities and extents should be mapped onto a topographical plan of the site (levels on the topographical plan should represent the post-development situation). If flooding is extensive the hazard should be considered in line with guidance from CIRIA's Design for Exceedance in Urban Drainage document.

5.16.2 Flows that exceed the design criteria must be managed in flow conveyance routes that minimise the risks to people and property both on and off site.

5.17 Finished Floor Levels

5.17.1 Finished floor levels (FFL) must be raised in line with current guidance. The GOV.UK guidance document "*Preparing a flood risk assessment: standing advice*" states that FFL should be 300mm above the surrounding ground level, to reduce the risk of exceedance surface water events flooding properties. In areas that are at risk of flooding from rivers or the sea, FFL should be raised to at least 600mm above the predicted flood level. If this is not possible then extra flood resistance and resilience measures must be implemented.

5.18Water Quality

5.18.1 Surface water discharging from the site must be treated appropriately (in accordance with the Simple Index Approach) to ensure there is little risk to polluting of surrounding groundwater, watercourses, water bodies or sewer systems. A treatment train should be formed to provide a range of different phases of surface water treatment. Chapter 26 of the CIRIA SuDS Manual (C753) outlines the pollution hazard indices. Surface water should meet these indices through the use of SuDS before discharge from the site.

5.18.2 Consideration should be given to surface water drainage from the highway and surface water treatment of these surfaces should also be in line with the principles set out in the CIRIA SuDS Manual. For most residential developments this will be classed as a lightly trafficked road and therefore surface water treatment must meet the corresponding pollution hazard indices.

5.18.3 It should be noted that features such as offline basins do not provide treatment for the longer return period storms before controls are exceeded directing surface water into these features. Therefore, systems which include features such as offline basins must meet the surface water treatment within the system for runoff from these lower return period storms.

5.19Pumping

5.19.1 Pumping of surface water is an unsustainable drainage method. Pumps present a significant residual risk if they are not maintained or fail during a storm event. Our preference is for gravity discharge to a watercourse or surface water drainage system, mimicking the natural drainage of the site and reducing energy consumption as stated in paragraph 6.3.5 and 6.3.28 of the Flood and Water Supplementary Planning Document (SPD).

5.19.2 We require that the applicant attempts to discharge as much surface water runoff via gravity as possible. This can be achieved through the use of larger areas of shallow attenuation or alternative SuDS approaches.

5.19.3 If it can be demonstrated that a partial or completely pumped drainage system is the only viable option we would require that the residual risk of flooding due to the failure of the pumps be investigated. We would require that the flood level be determined under the following conditions:

- The pumps were to fail; and
- The attenuation storage was 50% full; and
- The 1 % AEP +40% climate change event occurred

5.19.4 The pump failure modelling should be supported by an exceedance flow plan based on the topographic levels of the site to demonstrate the volume, depth and flow direction of flood water. The floor levels of the affected properties must be raised above this level and all flooding must be safely stored onsite.

5.20Riparian Ownership

5.20.1 Where new properties are located adjacent to a watercourse, each property would become the riparian owner for the section of watercourse that is adjoining, below, or through the curtilage of their property. This would increase the number of riparian owners from a single owner within the greenfield site, to a relatively large number in the post development layout. These property owners would inherit legal responsibilities associated with riparian ownership of the watercourse. The LLFA is generally opposed to this approach, as the onus of maintenance is divided across multiple landowners, meaning a lack of maintenance by one future resident may lead to flooding issues to the wider site and surrounding land and property. Much of the flooding that occurs in Cambridgeshire can be attributed, at least in part, to lack of riparian maintenance.

5.20.2 The site layout for the development should be designed to account for the existing drainage infrastructure, ensuring clear access for maintenance of the watercourse by a maintenance body. This access should include a suitable easement for any maintenance equipment that may be required for future maintenance works on the watercourse, this would ideally be a minimum of 5m wide.

5.21Management / Maintenance Arrangements

5.21.1 The management and maintenance of SuDS should appropriately account for the construction, operation and maintenance requirements of all components of the drainage system (surface and sub-surface). Applicants should sufficiently consider the likely maintenance requirements of new and existing infrastructure, over its design life including the provision of funding. It is important that maintenance is also considered in the design of the drainage system and the development site to account for the requirements of undertaking all stages of maintenance work such as ease of access whether this is for personnel, vehicles or machinery. This should include an adequately sized maintenance strip around open SuDS features such as ponds or basins to allow any machinery of vehicles to be able to access the basin for maintenance. As outlined in the CIRIA SuDS Manual (C753) this would ideally be 3.5m wide and designed to be able to withstand the use of maintenance vehicles. For features that do not require vehicular access for maintenance, should provide adequate and safe access for someone to be able to enter the feature to maintain the structure. For example, shallow side slopes and easy access points.

5.21.2 Proprietary systems, such as oil interceptors and silt traps, are often subject to blockage from silt and debris, and therefore demand frequent maintenance. As outlined in Section 32.6.8 of the CIRIA SuDS Manual, proprietary systems should be maintained in line with manufacturer recommendations, which will vary depending on catchment characteristics. For example, oil interceptor filters may require cleaning every 6 months if the runoff from the catchment has a high oil load.

5.21.3 Irrespective of the proposed method of surface water disposal, if an ordinary watercourse is riparian owned (e.g. within or adjacent to the redline boundary), developers must ensure that the watercourse is appropriately maintained and remediated. Any obstructions to flows e.g. in the form of sediment, debris, litter and fallen trees must be removed prior to handover. Likewise, any impact on water quality to the ordinary watercourses must be addressed prior to final handover. It is preferable that the ordinary watercourse be reinstated to better condition than it was initially found.

5.21.4 Ordinary watercourses can provide important habitats and may contain protected species of flora and fauna, as well as invasive species controlled under the Wildlife and Countryside Act 1981. Developers should note that finding the balance between allowing free flow of water and protecting the natural environment is critical. Appendix B - 'Ordinary Watercourses' provides further information on best practices for maintaining watercourses whilst protecting flora and fauna.

5.21.5 For outline and full applications we expect due consideration to have been given to potential organisations who may adopt / maintain the proposed surface water system and this should be outlined within the surface water drainage strategy.

5.21.6 When discharging a surface water condition, we will require evidence of who will be adopting/maintaining the drainage system for the lifetime of the development (in accordance with the Written Ministerial Statement, PPG and the SuDS Manual) alongside a management plan and maintenance schedule of work detailing the activities required. Appendix A has been provided for use as a template maintenance plan. We have also provided an example plan to show how it should be filled out.

5.21.7 Further guidance regarding the typical key operation and maintenance activities for each type of SuDS component are indicated in Table 32.1 of the CIRIA SuDS Manual. Where ordinary watercourses or other surface water features are bounding or within the development site, these should also be included within a management plan and maintenance schedule. Where new properties are located adjacent to a watercourse, each property would have riparian owner responsibilities to undertake maintenance and this should be clearly highlighted to future property owners or tenants. An alternative is to provide other management arrangements for these features such as encompassing them in the responsibilities of any third party company established for the site. We recommend that at least a 5m buffer should be allocated to an ordinary watercourse outside of IDB areas to allow for access for maintenance, in line with British Standards.

5.21.8 Where it is proposed that private homeowners will be adopting SuDS (e.g. permeable paving within the curtilage of private dwellings), maintenance plans and schedules should be clearly communicated to any future property owners. This should be done in accordance with section 12 and 11.4 of British Standard BS8582:2013. Such plans should further explain the consequences of not carrying out the maintenance.

5.21.9 There are several options for adoption and maintenance of SuDS and include:

- **Anglian Water** will consider adoption of a scheme designed to their standards set out in their SuDS Adoption Manual and the Design and Construction Guidance.
- An **Internal Drainage Board** may consider adopting a drainage scheme associated with new development if the site falls within or adjacent to their IDB area.
- Adoption could also potentially be agreed through a Section 106 Agreement with the **district, parish or city council**. This could be combined with any public open space maintenance agreement.
- A **third party company** could be established to adopt and maintain a SuDS Scheme across the whole or part of a development.
- **Individual property owners** can become responsible for management and maintenance where it falls within their property boundary, however this would not cover any public or open space or SuDS serving multiple properties.

5.21.10 Shared responsibility of drainage features is not accepted, as this could have implications for the maintenance and longevity of the drainage feature. Drainage features serving multiple plots should therefore be maintained by an adoptee or private management company, and not by individual plot owners.

5.21.11 Many development sites are constructed on land which may have had an agricultural use. No dwelling should be constructed over an existing culvert that is to remain active and any field drains intercepted on the boundary of the development should be diverted so overall land drainage discharge can be maintained.

5.21.12 If diversion or changes to any watercourse are proposed, Land Drainage Consent will be required from Cambridgeshire County Council as LLFA or the internal drainage board (where relevant).

5.22Surface Water Management during Construction

5.22.1 Surface water and groundwater bodies are highly vulnerable to pollution and the impact of construction activities. Construction materials such as cement, oils and fuels as well as the sediment disturbance from construction activity have the potential to pollute nearby water bodies. It is essential that the risk of pollution during the construction phase is considered and mitigated appropriately.

5.22.2 Developers should ensure that all built surface water infrastructure has been appropriately cleansed (to prevent obstruction to flow) prior to final handover, particularly where the permanent drainage infrastructure has been installed early in the construction phase.

5.22.3 Proposed SuDS should be installed at the beginning of the construction process where possible, to enable appropriate management and treatment of surface water runoff during construction. When this is not possible, temporary surface water treatment options should be introduced (please see CIRIA 768). We would typically expect the following information to be provided:

- Information detailing proposed mitigation measures ensuring surface water runoff can be managed during the construction phase. This should include but is not limited to temporary storage structures, discharge points, flow controls, and water quality control measures.
- Maintenance schedules and inspection frequencies for proposed mitigation measures.
- Confirmation of who will be responsible for the management and maintenance of any temporary controls.
- Commentary on phasing confirming adequate permanent drainage infrastructure will be in place to accept flows from impermeable areas to ensure no increase in flood risk during the construction period.

- Incident Action Plans outlining control measures to manage pollution incidents and ensure no detriment to water quality leaving the site.
- Location of any temporary hard surfacing and how these areas will drain and be managed.
- Exceedance flow routes supported by topographic data.

5.22.4 Wheel washing facilities should be provided at construction access points to cleanse vehicles prior to leaving the development area. These should be located away from watercourses to prevent direct runoff into adjacent watercourses.

6 CONDITIONS

6.1 Surface Water Conditions

6.1.1 In the following section we have included a list of standard conditions that we often use in our consultation responses. They cover most of the circumstances where conditions will be needed, but the list is not exhaustive. Some cases will require amendment of these conditions, or a completely new 'non-standard' condition to be drawn up.

Detailed Surface Water Scheme in line with Strategy
No laying of services, creation of hard surfaces or erection of a building shall commence until a detailed surface water drainage scheme for the site, based on the agreed [Title of report] prepared by [SPECIFY] (ref: [SPECIFY]) dated [SPECIFY] has been submitted to and approved in writing by the Local Planning Authority. The scheme shall subsequently be implemented in full accordance with the approved details prior to occupation of the first dwelling.

Detailed Surface Water Scheme
No laying of services, creation of hard surfaces or erection of a building shall commence until a detailed design of the surface water drainage of the site has been submitted to and approved in writing by the Local Planning Authority. Those elements of the surface water drainage system not adopted by a statutory undertaker shall thereafter be maintained and managed in accordance with the approved management and maintenance plan.

The scheme shall be based upon the principles within the agreed [Title of report] prepared by [SPECIFY] (ref: [SPECIFY]) dated [SPECIFY] and shall also include:

a) Full calculations detailing the existing surface water runoff rates for the Q_{BAR}, 3.3% Annual Exceedance Probability (AEP) (1 in 30) and 1% AEP (1 in 100) storm events;
b) Full results of the proposed drainage system modelling in the above-referenced storm events (as well as 1% AEP plus climate change), inclusive of all collection, conveyance, storage, flow control and disposal elements and including an allowance for urban creep, together with an assessment of system performance;
c) Detailed drawings of the entire proposed surface water drainage system, attenuation and flow control measures, including levels, gradients, dimensions and pipe reference numbers, designed to accord with the CIRIA C753 SuDS Manual (or any equivalent guidance that may supersede or replace it);

d) Full detail on SuDS proposals (including location, type, size, depths, side slopes and cross sections);
e) Site Investigation and test results to confirm infiltration rates;
f) Temporary storage facilities if the development is to be phased;
g) A timetable for implementation if the development is to be phased;
h) Details of overland flood flow routes in the event of system exceedance, with demonstration that such flows can be appropriately managed on site without increasing flood risk to occupants;
i) Demonstration that the surface water drainage of the site is in accordance with DEFRA non-statutory technical standards for sustainable drainage systems;
j) Full details of the maintenance/adoption of the surface water drainage system;
k) Measures taken to prevent pollution of the receiving groundwater and/or surface water

The drainage scheme must adhere to the hierarchy of drainage options as outlined in the NPPF PPG

Construction Phase
No development, including preparatory works, shall commence until details of measures indicating how additional surface water run-off from the site will be avoided during the construction works have been submitted to and approved in writing by the Local Planning Authority. The applicant may be required to provide collection, balancing and/or settlement systems for these flows. This should include the maintenance proposals during construction. The approved measures and systems shall be brought into operation before any works to create buildings or hard surfaces commence.

Surface Water Drainage Scheme Verification
Upon completion of the surface water drainage system, including any attenuation ponds and swales, and prior to their adoption by a statutory undertaker or management company; a survey and report from an independent surveyor shall be submitted to and approved in writing by the Local Planning Authority. The survey and report shall be carried out by an appropriately qualified Chartered Surveyor or Chartered Engineer and demonstrate that the surface water drainage system has been constructed in accordance with the details approved pursuant to condition [SPECIFY]. Where necessary, details of corrective works to be carried out along with a timetable for their completion, shall be included for approval in writing by the Local Planning Authority. Any corrective works required shall be carried out in accordance with the approved timetable and subsequently re-surveyed by an independent surveyor, with their findings submitted to and approved in writing by the Local Planning Authority.

Site Wide Strategy Required
Prior to submission of the first reserved matters application involving buildings, roads or other impermeable surfaces, a strategic surface water drainage strategy for the site shall be submitted to and approved in writing by the local planning authority. The scheme

shall be based on the parameters set out in the Flood Risk Assessment (FRA)/surface water drainage strategy [delete as appropriate] or any subsequent, revised version that has first been approved in writing by the local planning authority.

The scheme shall include phasing arrangements, details of primary infrastructure for each phase and plans for drainage asset operation, maintenance and contingency. The scheme shall set out what information, design parameters and design details will need to be submitted at the Reserved Matters stage for each phase of the development.

The development shall subsequently be implemented in accordance with the approved scheme.

Strategy for Future Reserved Matters Required

Any reserved matters application shall include a detailed surface water strategy pursuant to the reserved matters site for which approval is sought. The strategy shall demonstrate how the management of water within the reserved matters application site for which approval is sought accords with the approved details of the strategic site wide surface water strategy. The strategy shall be based upon a SUDS hierarchy, as espoused by the publication 'The SuDS Manual CIRIA C753'. The strategy shall maximise the use of measures to control water at source as far as practicable to limit the rate and quantity of run-off and improve the quality of any run-off before it leaves the site or joins any water body.

The strategy shall include details of all flow control system and the design, location and capacity of all strategic SuDS features and shall include ownership, long-term adoption, management and maintenance schemes and monitoring arrangements/responsibilities. The strategy should also demonstrate that the exceedance of the designed system has been considered through the provision of overland flow routes.

The development shall be carried out in full accordance with the approved details and no building pursuant to that particular reserved matters site for which approval is being sought shall be occupied or used until such time as the approved detailed surface water measures have been fully completed in accordance with the approved details.

Residential Maintenance Plan

Details for the long term maintenance arrangements for the surface water drainage system (including all SuDS features) to be submitted to and approved in writing by the local planning authority prior to the first occupation of any of the dwellings hereby permitted. The submitted details should identify runoff sub-catchments, SuDS components, control structures, flow routes and outfalls. In addition, the plan must clarify the access that is required to each surface water management component for maintenance purposes. The maintenance plan shall be carried out in full thereafter.

Non-Residential Maintenance Plan

Details for the long term maintenance arrangements for the surface water drainage system (including all SuDS features) to be submitted to and approved in writing by the Local Planning Authority prior to the first occupation of any building. The submitted details should identify runoff sub-catchments, SuDS components, control structures, flow routes and outfalls. In addition, the plan must clarify the access that is required to each surface water management component for maintenance purposes. The maintenance plan shall be carried out in full thereafter.

Detailed Surface Water Scheme in line with Strategy

No laying of services, creation of hard surfaces or erection of a building shall commence until a detailed surface water drainage scheme for the site, based on the agreed [Title of report] prepared by [SPECIFY] (ref: [SPECIFY]) dated [SPECIFY] has been submitted to and approved in writing by the Local Planning Authority. The scheme shall subsequently be implemented in full accordance with the approved details prior to occupation of the first dwelling.

7 USEFUL LINKS

National Planning Policy Framework

Planning Practice Guidance

Cambridgeshire Flood & Water SPD

BRE365 Digest

Building Regulations

Anglian Water Surface Water Policy

CIRIA SuDS Manual

CIRIA Designing for Exceedance

Written Ministerial Statement

8 ABBREVIATIONS/DEFINITIONS

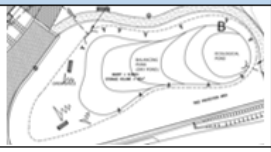
AEP	Annual Exceedance Probability
ASA	Association of SuDS Authorities
BRE	Building Research Establishment
CCC	Cambridgeshire County Council
CIRIA	Construction Industry Research and Information Association
EA	Environment Agency
Ha	Hectares
IDB	Internal Drainage Board
l/s	Litres per second
l/s/ha	Litres per second per hectare
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
m^3/ha	Cubic metres per hectare
NPPF	National Planning Policy Framework
PPG	Planning Practice Guidance
SPD	Supplementary Planning Document
SuDS	Sustainable Drainage Systems

APPENDICES

Appendix A – Maintenance Plan

Map of Drainage Maintenance Features

Please colour code the drainage components in line with the maintaining body (example below).

Type of Structure (Swale, Infiltration basin, etc.)	Feature on Drainage Layout Drawing (Screenshot)	Maintenance Schedule (Regular, Occasional, Remedial, Monitoring)	Required Maintenance	Frequency	Maintaining Body (Adopting Body, Private Management Company,
Balancing Pond		Regular	Remove Litter and Debris	Monthly (or as required)	Private management company
		Occasional	Remove sediment from main body of pond when volume reduced to 20%	As required	
		Remedial	Repair erosion or other damage	As required	

Appendix B – Watercourse Ownership

It is not always immediately clear who is responsible for a watercourse or who has riparian responsibility as there are a number of options. The following resources may help you in ascertaining responsibility:

IDB Watercourses
The IDB watercourses map shows which areas are covered by Internal Drainage Boards (IDB). If the watercourse is within an IDB area, it is likely that they will be responsible for discharge consents.

Environment Agency Main Rivers
The Environment Agency Statutory Main River Map shows which watercourses are Main River. The Environment Agency is responsible for permitting connections into Main River.

Awarded Watercourses
Some watercourses are 'awarded' – often to District/City Councils. In this case, the District/City council would have responsibility for maintenance. Further information can be found within the relevant SFRA of that Council.

Ordinary Watercourses
Ordinary watercourses are generally owned by the 'riparian owner' (those who own land adjoining, above or with a watercourse running through it). Most watercourses in Cambridgeshire are 'riparian' owned. Further information can be found here: Watercourse management - Cambridgeshire County Council