LASOO
Local Authority SuDS Officer Organisation

NON-STATUTORY TECHNICAL STANDARDS FOR SUSTAINABLE DRAINAGE

Practice Guidance

HBF HOME BUILDERS FEDERATION

HBA House Builders Association

Contents

Background

Since February 2013 Defra facilitated Task and Finish Groups to provide definition for planning of development with respect to surface water management. These groups considered technical and regulatory matters.

Defra then established an industry-wide stakeholder group incorporating local authorities, development industry, sewerage undertakers, Highways Agency, Environment Agency (EA) and Water UK to further define and clarify proposed technical standards in relation to Government's implementation of sustainable drainage policy.

A Steering Group was made up of members of the Task and Finish Groups which has focused on the development of the practice guidance to provide an interpretation of the non-statutory technical standards.

Steering Group members:

Bronwyn Buntine	**Kent County Council**
Owen Davies	**Royal Borough of Greenwich**
Nick Humphrey	**Camden Borough Council**
Andrew Leadbetter	**Peterborough City Council**
John Rumble	**Hertfordshire County Council**
Bava Sathan	**Surrey County Council**
Kevin Tidy	**Bracknell Forest Council**
Mark Welsh	**Lincolnshire County Council**
Johnathan Glerum	**Anglian Water Services**
Brian Morrow	**United Utilities**
Paul Voden	**House Builders Association**
Ray Farrow	**Home Builders Federation**
Stephen Wielebski	**Home Builders Federation**

Introduction

1.1. The Minister announced on 18 December 2014 that sustainable drainage would be delivered through the planning system. This relies on the National Planning Policy Framework, Planning Practice Guidance and Non-statutory Technical Standards (technical standards) for sustainable drainage systems, produced and issued by Government.

1.2. Planning applications for major development should therefore be accompanied by a site-specific drainage strategy or statement that demonstrates that the drainage scheme proposed is in compliance with the NPPF and the Nonstatutory technical standards. The NPPF (and associated PPG) relates to Government policy on the provision and long term maintenance of sustainable drainage systems. The technical standards provided by Government relate to the design, construction, operation and maintenance of sustainable drainage systems (SuDS) and have been published as guidance for those designing schemes.

1.3. This guidance supports the technical standard in question, and provides a brief explanation to provide clarification. It will be reviewed periodically to reflect best practice.

1.4. Although sustainable drainage systems can be utilised to deliver water quality, amenity, biodiversity and landscape, the technical standards do not consider these matters which are addressed through planning policy. Water quality considerations are covered by the National Planning Policy Framework (NPPF) and biodiversity, amenity and landscape may be found in local planning policy.

1.5. Drainage should be considered as an integral part of the land acquisition due diligence process, that is early in the development planning and design process, along with other key considerations such as:

- Layout
- Density
- Site access
- Topography
- Ground conditions
- Discharge destinations

1.6. It is easier and more cost effective to incorporate sustainable drainage systems along with landscape design from the earliest stages of planning a development. Even for small developments (one or two houses), cost effective drainage solutions are best achieved by integrating components into the overall site design.

1.7. The technical standards and guidance were developed by a multi-stakeholder group representing Lead Local Flood Authorities, HBF, HBA and Water and

Sewerage Companies facilitated by Defra. The standards relate specifically to the design, construction, operation and maintenance of sustainable drainage systems and have been published as guidance to those designing schemes.

1.8. This practice document is not intended to define the full technical detail and justification for drainage applications. This information is provided in other documents, which are clearly referenced and annotated in this guide.

1.9. This guidance document is presented as practice, a "living" document and therefore will be reviewed annually based upon feedback received from stakeholders. Comments should be submitted via the LASOO forum on Knowledge Hub.

1.10. The imposition of any standard(s) above those now defined by Government, namely S1 to S14 inclusive, will need to be evidence based, viability tested and subjected to public consultation before it can be imposed as local plan policy that has the required weight to be regarded as a material planning consideration. This is a matter for the Local Planning Authority.

Process for delivering sustainable drainage

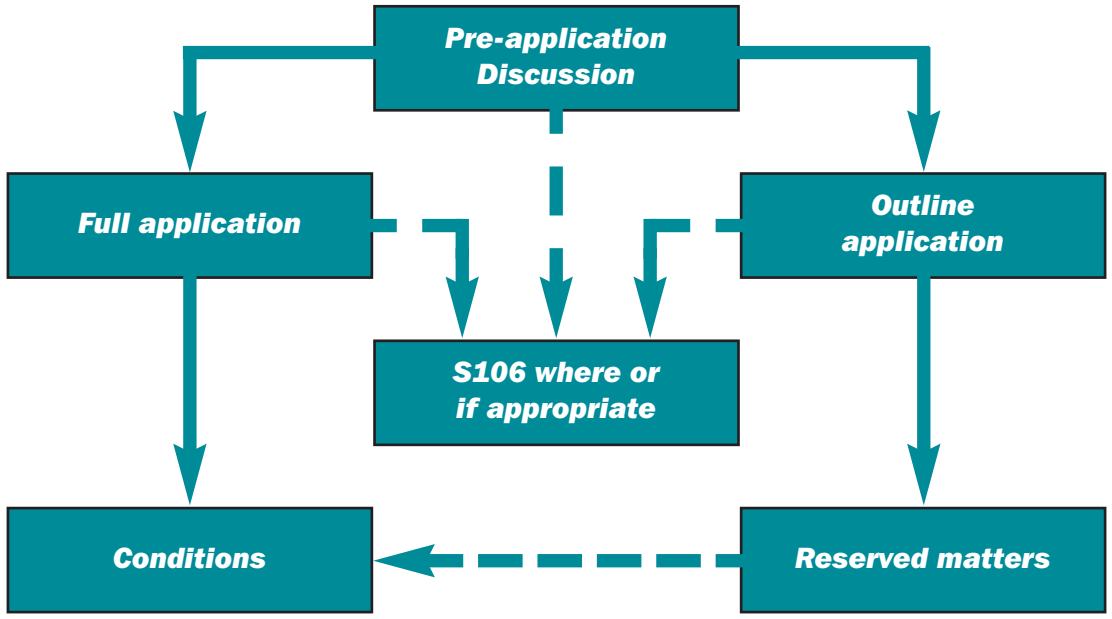
Introduction

2.1. It is essential that the consideration of sustainable drainage takes place at the land acquisition due diligence stage and that this feeds in to the design process. Drainage information then informs any planning application.

2.2. By adopting the principle of 'working from the whole to part' and considering all aspects of the site and the proposed development, this should ensure that the most cost effective, well designed sustainable surface water drainage system is delivered without compromising project viability.

"Delivery of sustainable drainage is different, not difficult"

Illustrative Planning Process



NOTE: Dashed links indicate the optional parts of the process

Pre-application discussions

2.3. It is highly recommended that pre-application discussions take place before submitting an application to the local planning authority. Ideally, these discussions should start at the land acquisition due diligence stage and continue as part of the pre-planning application process.

2.4. The more issues that can be resolved at pre-application stage, the greater the benefits. For their role in the planning system to be effective and positive, statutory planning consultees will need to take the same early, pro active approach, and provide advice in a timely manner throughout the development process. This assists local planning authorities in issuing timely decisions, helping to ensure that applicants do not experience unnecessary delays and costs.

2.5. At pre-application stage, the applicant should enter into discussions with:

- The Local Planning Authority (LPA), with respect to Local Plan requirements for SuDS including biodiversity, ecology, water quality, open space, maintenance and landscape which may impact sustainable drainage delivery; and,
- The Lead Local Flood Authority (LLFA), with respect to local flood risk and ordinary watercourses taking into account the technical standards.

2.6. The participation of other consenting bodies in pre-application discussions should enable early consideration of all the fundamental issues relating to whether a particular development will be acceptable in principle, even where other consents relating to how a development is built or operated are needed at a later stage. These other agencies or bodies include, but are not limited to:

- Environment Agency
- Internal Drainage Board
- Canal and River Trust
- Highway Authority, and
- Relevant sewerage undertaker only where a connection to a public sewer is proposed

2.7. The applicant should collect all available information pertaining to the site, which may affect the manner in which a drainage solution is proposed. This information may facilitate pre-application discussions and could include:

- Strategic flood risk assessment
- Local flood risk management strategy
- Surface water management plans
- Surface water flood risk maps
- Local flood history
- Flood defence asset information

2.8. The Local Planning Authority may offer a multi-disciplinary approach to preapplication discussion, which addresses matters collectively.

Matters to be discussed

2.9. Each development is individual, and pre-application discussions which look at the particular site, its surroundings and constraints will help to ensure that when the application is made, relevant information is submitted to enable the local planning authority to determine the application.

2.10. It is not possible to produce an exhaustive list of issues that may need to be discussed, however the following are principal matters which will generally need to be considered as part of the pre-application process, for example when submitting an outline planning application:

- Existing topography - how water naturally flows on and/or through the site, including land drainage flows in general
- Hydrogeology (i.e. groundwater considerations) – consideration to be given to groundwater levels and the transient nature of groundwater
- Proposed land re-grading/earthworks which may affect natural and/or proposed drainage
- Proposed site remediation/de-contamination works and any proposals under consideration for soil improvement, i.e. lime, cement stabilisation
- Constraints on and off the site
- Phased, one-off or cumulative development
- Proposed destination(s) for surface water post-development and any possible constraints
- Surface water storage volumes and locations
- Permissible or allowable peak flow rate
- Existing or proposed watercourses, and potential capacity limitations including third party consents to discharge
- Existing or proposed surface water sewers and/or pumping stations
- Flood risk to and from the site with proposed mitigation
- Offsite works which may be required to provide surface water drainage
- Temporary drainage during construction
- Presence of any sensitive receptors, e.g. SPZ or sensitive off-site third party assets
- Existing and proposed highways
- Future maintenance and possible adoption arrangements as required in the NPPF
- Consents required
- Possible designation of flood features by the LLFA/EA
- How the Planning Practice Guidance (PPG) and technical standards will influence the design
- Possible conditions or planning obligations
- Environmental and ecological considerations

2.11. If the pre-application discussions are to lead to a full planning application being made, the following additional issues may also need to be considered, particularly with regard to meeting the technical standards:

- Surface water storage volumes and locations,
- Sub-catchment areas
- If appropriate, treatment train components
- Proposed landscaping and/or vegetative systems
- Design calculations for:
  - greenfield run-off
  - brownfield run-off
  - infiltration rates where required
  - peak flow rates
  - surface water volume(s)
  - attenuation/storage requirements
  - drain down times
- Multi-use areas
- Exceedance routes
- Temporary drainage during construction
- Climate change allowances
- Future development allowances, if appropriate

2.12. Relevant questions to ask during the pre-application discussion are:

a. Location of the final discharge destination in relation to the hierarchy of discharge. Has this been considered?

b. If the surface water infiltrates to the ground have discussions taken place with the EA and/or sewerage undertaker in relation to pollution risk to any underlying aquifers? Have such proposals been considered alongside the agreed/approved remediation strategy for the site? What is the risk of infiltration drainage mobilising relict contaminants in an otherwise benign environment? Reference should be made to relevant infiltration mapping e.g. British Geological Survey (BGS) maps and EA monitoring data.

c. If the surface water discharges to a water body, have discussions taken place on the consent or rights to discharge?

d. If the surface water discharge is to a sewer or highway drain, have discussions taken place with the appropriate sewerage undertaker and Highways Authority?

e. There may be a number of constraints within or outside of the development that may have an impact on the SuDS scheme which could include; issues around soil geology, topography, ground water, remediation etc. Have all these issues been identified?

f. Have all the drainage components/connectivity of the system been determined within the development and outside the development?

g. Are there any off site issues for the surface water discharge? Have these been considered? (e.g. access across third party land, or offsite works to proposed destinations).

h. As part of the development and the SuDS scheme are there any environmental or ecological issues that need to be considered? (e.g. water quality or biodiversity issues).

i. Will the SuDS scheme require phasing?

j. Are there any cumulative effects from development to be taken into account?

k. The topography of a development is an important factor of the SuDS scheme, is there any substantial re-grading of the development which will affect the SuDS scheme?

l. What is the anticipated development programme for the site?

m. Are there any temporary arrangements that you are aware of for the drainage that needs to be discussed?

n. Have discussions taken place with the Highways Authority around the interaction of managing the surface water?

o. Have discussions taken place regarding how the planning practice guidance and technical standards will influence the design?

p. Have matters surrounding accessibility and future maintenance been incorporated into the design?

q. Has the need for a maintenance plan been considered, which takes into account the drainage design and components being proposed?

r. What conditions or planning obligations may be required?

s. Will there be any flood risk features which will require designation?

(Note: the likely range of questions will vary depending upon whether the preapplication discussions are intended to lead to an outline or full planning application being made).

Planning Applications

2.13. Planning applications may be made either as an Outline application with one or more matters reserved for later determination, or as a Full application.

2.14. The level of information which would need to be submitted for each type of application or stage within the planning process will vary depending on the size of the development, flood risk, constraints, proposed sustainable drainage system and so on as shown in the table below:

Pre-app	Outline	Full	Reserved	Discharge	Document submitted
✓	✓	✓			Flood Risk Assessment/Statement (checklist)
✓	✓	✓			Drainage Strategy/Statement & sketch layout plan (checklist)
	✓				Preliminary layout drawings
	✓				Preliminary "Outline" hydraulic calculations
	✓				Preliminary landscape proposals
	✓				Ground investigation report (for infiltration)
	✓	✓			Evidence of third party agreement for discharge to their system (in principle/ consent to discharge)
		✓		✓	Maintenance program and on-going maintenance responsibilities
		✓	✓		Detailed development layout
		✓	✓	✓	Detailed flood & drainage design drawings
		✓	✓	✓	Full Structural, hydraulic & ground investigations
		✓	✓	✓	Geotechnical factual and interpretive reports, including infiltration results
		✓	✓	✓	Detailed landscaping details
		✓	✓	✓	Discharge agreements (temporary and permanent)
		✓	✓	✓	Development Management & Construction Phasing Plan

Additional information may be required under specific site conditions or development proposals.

2.15. Whether the application is an outline or full application, the surface water drainage for the application is determined at the time when the application itself is determined.

2.16. Following an outline application, reserve matters must be consistent with the drainage strategy which was approved.

2.17. For a full application it would usually be necessary for a fully detailed drainage design or strategy to be submitted for consideration by the LPA and to be subject to comment by the statutory consultees or others that the LPA may wish to consult.

2.18. The drainage strategy may include a Flood Risk Assessment, but in some circumstances a fully detailed design does not form part of a flood risk assessment.

Statutory Consultations

2.19. The Lead local Flood Authority is the statutory consultee for Major development with surface water drainage. However, local arrangements may exist between the LPA and the Lead Local Flood Authority (LLFA) with regard to providing advice/comments on Minor development.

2.20. The Environment Agency is the statutory consultee, as stated in the:

Development Management Procedure Order 2015 for:
Development involving the carrying out of works or operations in the bed of, or within 20 metres of the top of a bank of, a main river which has been notified to the local planning authority by the Environment Agency as a main river for the purposes of this provision

Development, other than minor development, which is to be carried out on land:
(i) in an area within Flood Zone 2 or Flood Zone 3; or
(ii) in an area within Flood Zone 1 which has critical drainage problems and which has been notified to the local planning authority by the Environment Agency

Non-Statutory Consultations

2.21. It would be normal if discharging to a drainage system maintained/operated by other authorities (IDBs, highway authority, sewerage undertaker, or Canals and River Trust) that evidence of consultation and the acceptability of any discharge to their system is presented for consideration by the LLFA and LPA.

Conditions and Planning Obligations

2.22. The granting of approval for an outline or full application may result in conditions and/or reserve matters being attached.

2.23. These conditions may address the drainage design and its integration with layout, landscaping, maintenance, compliance with the technical standards, etc.

2.24. The statutory consultees may wish to recommend conditions for the LPA to consider, but they will be a matter for the LPA to determine whether they are appropriate.

2.25. In some circumstances it may be that planning obligations via a Section 106 agreement may be used in lieu of conditions. Conditions associated with drainage and flooding cannot be "deemed to be discharged" and must be reviewed and approved prior to discharge.

Non-statutory technical standards

Introduction to delivering sustainable drainage

3.1. The layout of the development site and the drainage system should be designed to mimic natural drainage flow paths, utilising existing natural lowlying areas and conveyance pathways where appropriate.

3.2. Where development results in changes in natural flow paths and runoff destinations, the design must account for how the surface flows are managed and demonstrate it does not impact on off-site flood risk.

3.3. Exceedance flows that cannot be contained within the drainage system must be managed via flood conveyance routes. If the proposed system connects to an existing drainage system, whether it is a sewer, highway drain, water body or sustainable drainage system, consideration must be given to the operational capacity and functionality of the existing system to ensure that no adverse impacts result or flood risk is increased on-site or off site.

3.4. Design principles are based upon practice including:

a) Any design proposal must consider the standards collectively;

b) Any drainage proposal must accommodate surface water flows from the entirety of the site, including both permeable and impermeable areas so as to not increase flood risk;

c) Any drainage proposal should aim to control the runoff volume to protect both the morphology and water quality of the receiving waters;

d) Any drainage proposal should aim to manage surface water within subcatchments, close to source and at or near surface as reasonablypracticable;

e) Any drainage proposal must consider overland flows onto the site;

f) Maintenance requirements, including provision for utilities and other services, must be considered during design to ensure continued operation of the drainage system;

g) Good design of the drainage system will assist in meeting the requirements for the provision of open space (as defined in the NPPF);

h) Design is cost-effective to operate and maintain over the design life of the development, in order to reduce the risk of the drainage system not functioning;

i) The design of the drainage systems must account for the likely impacts of:
- climate change; and
- changes in impermeable area; over the design life of the development. Appropriate allowances are setout by the Environment Agency on the GOV.UK web site;

j) Design of a drainage system must consider requirements for urban design that may be specified by the Local Planning Authority, particularly in relation to landscape, visual impacts, aesthetics, biodiversity and amenity. Pre-application discussion should address these other matters; and,

k) Surface water shall under no circumstances be discharged to a foul sewer.

3.5. Flooding may also occur in relation to failure of a significant component within the drainage system. The design process should consider the local consequences of these failures and take appropriate steps to mitigate any subsequent flood risk.

3.6. Guidance on standards, both technical and those presented within the NPPF and PPG are included within this section for completeness and ease of reference.

Runoff Destinations

See the Planning Practice Guidance

This states:

"Generally the aim should be discharge surface runoff as high up the following hierarchy of drainage options as reasonably practicable:

1. Into the ground (infiltration)
2. To a surface water body;
3. To a surface water sewer, highway drain or another drainage system;
4. To a combined sewer."

Explanation:

3.7. It is recommended to manage surface water as close to the source i.e. where the rain falls. The effective of control and management of surface water runoff will be addressed through the application of the above drainage hierarchy. Any drainage strategy proposal should clearly demonstrate how the movement down the hierarchy has been considered for the proposed discharge destination.

3.8. Each site will have unique characteristics and these should guide the selection of the most appropriate set of SuDS techniques. Not all SuDS techniques will be suitable for all sites and therefore it is important that the opportunities and constraints are identified at an early stage in the design process. SuDS selection is a key part of the planning and design of the development and should be undertaken in conjunction with all stakeholders.

3.9. It is not always possible to drain the whole site entirely using any one runoff destination. A site may be divided into different sub-catchment areas which contribute to different drainage locations and/or systems on or off-site for example, because of differing soils and geology. Where possible, existing drainage pathways should be followed within the proposed drainage system.

3.10. Some locations will preclude the consideration of infiltration as a runoff destination. For example, this may be due to soil infiltration characteristics or ground water levels. The potential impacts on both on-site and off-site flood risk should be considered in the selection of each discharge destination or component.

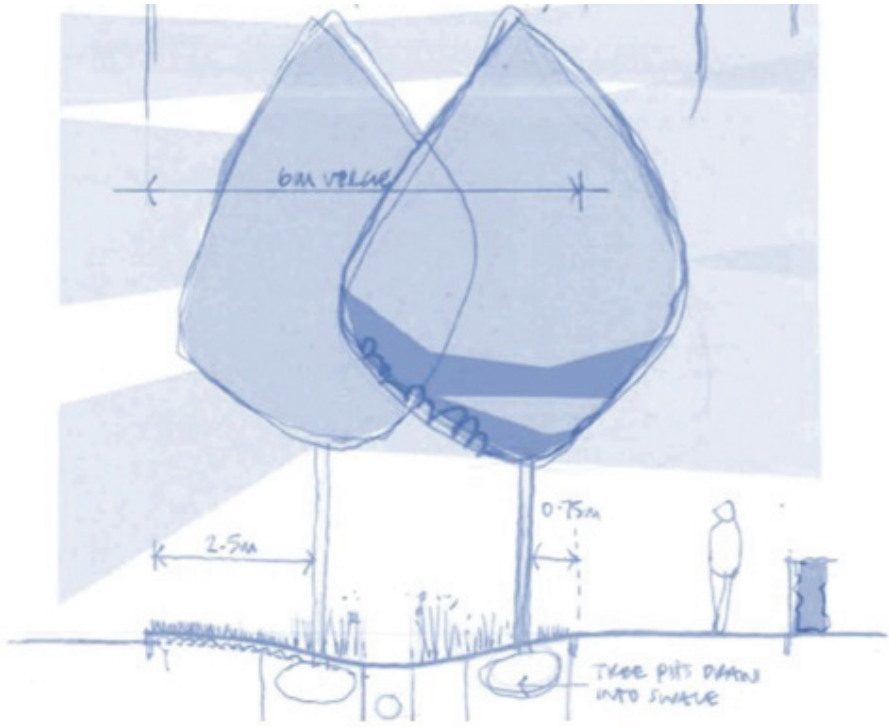
3.11. Discharge to a surface water body may require consent of the land owner, may be subject to approval for discharge and will require consideration of the existing water body condition. The status of the receiving water may influence the regulatory requirements for quantity or quality control. Environmental Quality Assessments for water courses may be available from the Environment Agency.

3.12. Where the proposed destination is a surface water sewer, highway drain or another drainage system, it is incumbent on the applicant to discuss with the system owner and the owners of downstream systems, what the potential impacts of the connection would be. Any connection may be subject to other regulatory factors and/or formal approval from the asset owner(s). An example would be a connection to a highway drain that then connects to a public sewer, which then drains into a main river then in order to avoid flood risk there should be sufficient capacity in the drainage system as a whole for the proposed approach.

3.13. The proposed point of connection and discharge rate to any destination must be agreed with the relevant owner or responsible body which includes, but not limited to, internal drainage boards, highway authorities, sewerage undertakers, riparian owner, Environment Agency, Canals and River Trust and others.

3.14. Any proposal for water re-use should be given due consideration and may be governed by other regulatory factors.

3.15. Particular types of sustainable drainage systems may not be practicable in all locations. It could be helpful therefore for Lead Local Flood Authorities or Environment Agency to set out those local situations where they anticipate particular sustainable drainage systems may not be appropriate.



Flood Risk Outside the Development

See paragraph 103 of the National Planning Policy Framework.

This states that:

"When determining planning applications, Local Planning Authorities should ensure flood risk is not increased elsewhere and only consider development appropriate in areas at risk of flooding where, informed by a site-specific flood risk assessment following the Sequential Test, and if required the Exception Test, it can be demonstrated:

- **Within the site, the most vulnerable development is located in areas of lowest flood risk unless there is overriding reasons to prefer a different location; and**
- **Development is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed, including by emergency planning; and it gives priority to the use of sustainable drainage systems."**

S1. Where the drainage system discharges to a surface water body that can accommodate uncontrolled surface water discharges without any impact on flood risk from that surface water body (e.g. the sea or a large estuary) the peak flow control Standards (S2 and S3) and volume control Standards (S4 to S5) need not apply.

Explanation:

3.16. Coastal or estuarine waters can be deemed sufficient to accommodate uncontrolled surface water discharges. Any discharge to coastal or estuarine waters may require Environment Agency consent in line with Environmental Permitting regulations for discharge to controlled waters, as well as consent from the Marine Management Organisation for any building of infrastructure within the marine environment.

3.17. Where appropriate, the design of the drainage systems which discharge to tidal water will need to take account of the effect of "tide locking", storm surge or submergence of the outfall. An appropriate allowance for sea levels over the lifetime of the development should be incorporated.

3.18. For all other water bodies, the applicant should consult the LPA as to what other assessments may be required to determine whether uncontrolled discharge is appropriate. This may include consultation with Internal Drainage Boards.

Peak Flow Control

S2. For greenfield developments, the peak runoff rate from the development to any highway drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event should never exceed the peak greenfield runoff rate for the same event.

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

Explanation:

3.19. The most appropriate method for calculating the peak greenfield runoff rate should be agreed with the LPA, who may seek advice from other relevant bodies.

3.20. Consultation with the Local Planning Authority, Lead Local Flood Authority and other relevant authorities should be undertaken to confirm the allowable peak flow early on in the design process.

3.21. Where site runoff is to be discharged to the surface water sewer or combined sewer, the sewerage undertaker should be consulted as to whether any additional or alternative discharge controls are required. These controls need to be considered in light of the sewerage undertakers existing statutory duties, legislation and regulatory requirements.

3.22. Where site runoff is to be discharged to highway drainage, the highway authority should be consulted as to whether any additional or alternative discharge controls are required.

3.23. Where calculated uncontrolled runoff rates from the development are greater than the permitted discharge rates from the site, attenuation storage systems and flow controls should be used.

3.24. Flow control components should be kept as simple as possible.

3.25. Any minimum requirements for pipe or throttle sizes should be agreed. The risk of blockage from sediment or other debris should be minimised by including mitigation measures in the design, such as inclusion of bypass or overflows.

3.26. Previously developed land is likely to have had a positive drainage system to drain surface water runoff from the site. Where these systems are still operational (and this can be demonstrated) and the details of components can be provided (diameter/ levels/ lengths), these may be utilised for assessment and design purposes, along with the contributing area characteristics of the site, to define the existing flow discharge characteristics for the one or more outfalls from the site

3.27. The Lead Local Flood Authority, through flood risk studies and assessment, may have identified needs for strategic flood alleviation infrastructure. These strategic facilities may provide solutions for sites which are not able to meet peak flow rate control standards onsite. Forthcoming development sites may also have been identified as being able to offer opportunities to contribute to a wider reduction in flood risk.

Volume Control

S4. Where reasonably practicable, for greenfield development, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event should never exceed the greenfield runoff volume for the same event.

S5. Where reasonably practicable, for developments which have been previously developed, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event.

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

Explanation:

3.28. The control of volume is as important as the peak runoff rate because flood risk can be increased by the additional volume coming off the site even if the peak run off rate remains at greenfield values.

3.29. In line with the overall design principles, the system should be designed to prevent surface water runoff from the whole development for a large proportion of events having a negative impact on the morphology of receiving surface water bodies.

3.30. This part of the technical standards should be considered in conjunction with S2 and S3 as the two standards together are needed to effectively control surface water runoff, and there are a number of interactions between the criteria within the two standards.

3.31. The Lead Local Flood Authority through flood risk studies and assessment may have identified the need for strategic flood alleviation infrastructure. These strategic facilities may provide solutions for sites which are not able to meet volume flow rate control standards onsite. Forthcoming development sites may also have been identified as being able to offer opportunities to contribute to a wider reduction in flood risk.

3.32. In some instances the design may not be able to accommodate the requirements for volume control, however, consultation with the Lead Local Flood Authority, together with other risk management authorities if necessary, should be undertaken to identify other potential off-site catchment options are available and feasible; or whether, a specific discharge rate and associated attenuated volume for the site may be discussed with the Lead Local Flood Authority.

Flood Risk Within the Development

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

S8. The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100 year rainfall event in any part of: a building (including a basement) or in any utility plant susceptible to water (e.g. pumping station or electricity substation within the development.

S9. The design of the site must ensure that so far as is reasonably practicable, flows resulting from rainfall in excess of a 1 in 100 year rainfall event are managed in exceedance routes that minimise the risks to people and property.

Explanation:

Design criteria for capacity

3.33. The layout of the development site and the drainage system should be designed to mimic natural drainage flow paths, utilising existing natural lowlying areas and conveyance pathways where appropriate.

3.34. The drainage system must be designed to operate without flooding for up to the 1 in 30 year event and accommodate the 1 in 100 year making sure sufficient steps are taken to ensure that any surface flows between the 1 in 30 and 1 in 100 year events are stored. The choice of where these volumes are accommodated may be within the drainage system itself or within other areas designated within the site for conveyance and storage.

3.35. The capacity of the drainage system should consider and take into account, where agreed, concurrent events e.g. joint probability flood events as occurs with rainfall events combined with high tide, storm surge or at river confluences.

3.36. Areas of the site that may be designed to accommodate flows or flooding greater than the 1 in 30 year event (such as car parks and landscaped areas) must route water away from any buildings or utility plant susceptible to water, avoid creating hazards to access and egress routes and must be designed to be resilient to flooding.

3.37. Finished floor levels and the level of any opening into any basement should be greater than 300mm above the maximum flood level, up to and including the 1 in 100 year return period event.

3.38. Access should be maintained into and through the site for emergency vehicles up to and including the 1 in 100 year events. The drainage application ought to give consideration to flood risk vulnerability classifications (as defined through Planning Practice Guidance to the National Planning Policy Framework), as specific measures or protections may be assessed and need to be agreed with the appropriate authority.

3.39. The time required for the storage to accept further storm flows should be considered, especially if downstream flood levels can affect the outfall. Attenuation storage volume provided by any drainage area should half empty within 24 hours so that it can receive runoff from subsequent storms. If the drain down time (full to empty) is more than 24 hours, then long duration events should be assessed to ensure that drainage is not compromised by inundation (e.g. periods of wetting on vegetation or slope failure).

3.40. The design of the drainage system must account for the likely impacts of climate change and changes in impermeable area.

Design in relation to existing drainage

3.41. The proposed drainage system should be designed to reflect or consider the purpose of existing features which may be identified in other adopted flood risk management documents.

3.42. The proposed drainage system must be designed to accommodate any existing flows from upstream catchments that are intercepted or affected by the development.

Design for exceedance

3.43. It is impossible to design a drainage system that will never flood. To help prevent flooding of the development and uncontrolled inundation of downstream locations, where reasonably practicable, provision should be made for appropriate management for flows generated in storm events that exceed the design standard of the drainage system.

3.44. Flows should be managed in flood exceedance routes: the primary consideration should be risks to people and property.

3.45. When assessing exceedance routing or temporary storage, depths of flow, velocities and freeboard should be taken into account.

Structural Integrity

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

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

Explanation:

3.46. Any drainage component installed below or adjacent to new infrastructure, such as a foul sewer, should have a design life compatible with that infrastructure.

3.47. Any drainage component installed below or adjacent to existing infrastructure such as retaining walls, which are outside the ownership of the applicant, the applicant should have due regard to its existing condition and the design should not have any adverse impact on the existing infrastructure.

3.48. It is critical that any components that require replacement and/or maintenance should be designed to be accessible without undue impact on the drainage system and adjacent structures or infrastructure.

3.49. Material should not react and/or degrade over time to the detriment of the drainage system and adjacent structures or infrastructure.

3.50. Materials and/or construction techniques should ensure the structural stability of structures/features during extreme events e.g. long periods of rainfall causing saturation.

Designing for Maintenance considerations

See also the Written Ministerial Statement of 18 December 2014:

(https://www.gov.uk/government/speeches/sustainable-drainage-systems).

This states that:

"Under these arrangements, in considering planning applications, local planning authorities should consult the relevant lead local flood authority on the management of surface water; satisfy themselves that the proposed minimum standards of operation are appropriate and ensure through the use of planning conditions or planning bligations that there are clear arrangements in place for ongoingmaintenance over the lifetime of the development. The sustainable drainage system should be designed to ensure that the maintenance and operation requirements are economically proportionate."

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

Explanation:

3.51. Future maintenance requirements should be considered at all stages in the design and construction process and suitable access provided to facilitate all reasonably foreseeable future inspection, monitoring, maintenance or repair works.

3.52. The location of service strips should be taken into account during design to ensure minimal disruption to sustainable drainage elements

3.53. In the determination of economically proportionate there is a balance to be had between the initial costs of the SuDS components and the long term maintenance and operational costs. It is important therefore that discussions are held between the LPA and the applicant regarding the types of SuDS to be used.

3.54. The choice of materials and drainage components should take account of future maintenance and operational needs; and available viable maintenance options may play a part in dictating choices better made in the design phase. The management and control of erosion and sediment should be a key consideration throughout design and construction, operation and maintenance.

3.55. Each SuDS component should normally be designed with appropriate upstream sediment management controls. If the component provides the pre-treatment function itself, then appropriate maintenance activities should be undertaken.

3.56. Minimising the dependence upon pumping also minimises the performance risks associated with inadequate maintenance and/or product or power failures (which are likely to occur during thunderstorms and intense rainfall).

Construction

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

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

Explanation:

3.57. Construction must comply with appropriate applicable standards.

3.58. The mode of communication between the proposed and the existing drainage system, which is a watercourse, consideration should be given to ensuring there is no consequential damage to the feature e.g. erosion. The mode of communication between the new drainage systems and the watercourse may be inspected by the landowner or consenting authority.

3.59. The mode of communication between the new drainage systems and the existing sewer may be inspected by an adopting authority.

3.60. Failure to rectify any damage to the drainage system may be subject to enforcement action by the relevant enforcement authority or owner.

Appendix A:

Additional Sources of Information

- CIRIA Manual C697
- CIRIA Manual C609
- CIRIA Manual C635
- CIRIA Manual C698
- CIRIA Infiltration Drainage R156
- The British Geological Survey's Geosure national data sets
- BGS SuDS Infiltration Drainage Maps.
- Information for the preparation of flood risk assessments is contained within the NPPF Planning Practice Guidance.
- ADAS guidance
- IoH124
- Flood Estimation Handbook (FEH)
- "Preliminary Rainfall Runoff Management for Development", RD Technical Report W5-074/A/TR/1 Revision E, January 2012.
- BS 8582 - Code of practice for surface water management for development sites
- BBA - British Board of Agrément
- Codes of Practice
- Highways Specifications
- NJUG – National Joint Utilities Group
- NHBC – National House Building Council
- Building Regulations Approved Document H
- Interpave
- Environment Agency's Pollution Prevention Guidance Note 5 "Works and maintenance in or near water"
- Civil Engineering Specification for the Water Industry
- Relevant British / European Standards
- Local Highway Authority specifications
- Sewers for Adoption
- Design Manual for Roads and Bridges (DMRB) and/or specification for highway works as appropriate

Appendix B:

Definitions

For the purposes of these standards and this document the following definitions apply.

"1 in 1 year rainfall event" means an event that has a probability of occurring, on average, once a year. The depth of rainfall for the event will depend on the duration of event being considered.

"1 in 30 year rainfall event" means an event that has a probability of occurring, on average, of 3.3% in any one year. The depth of rainfall for the event will depend on the duration of event being considered.

"1 in 100 year rainfall event" means an event that has a probability of occurring, on average, of 1% in any one year. The depth of rainfall for the event will depend on the duration of event being considered.

"Climate change allowances" These are appropriate allowances for the predicted changes in Sea Level, Rainfall, peak River flow etc. as a result of climate change – see information provided by the Environment Agency on the GOV.UK web site

"Communication" method by which the approved drainage system connects to a public sewer, drainage system or water body

"Completed" drainage system is considered to be complete when the works have been constructed fully in accordance with the approved design

"Curtilage" the area of land around a building or group of buildings which is for the private use of the occupants of the buildings.

"Damage" damage within the context of construction includes any impact on functionality e.g. silt deposits, broken pipes, ruts, loss or lack of vegetation, damage to topsoil caused by stockpiling too high

"Design life of the development" Dependent on nature of site and development. Typically 60 years for commercial development.

"Drainage strategy" A document containing the full design, construction, operation and maintenance details of a drainage system to manage surface water. This document will form part of the drainage application which is submitted to the local planning authority for determination.

"Drainage system" all the components that convey the surface to a point of discharge.

"Exceedance" an event that exceeds the capabilities of the surface water drainage system could be excessive rainfall, or blockage or combination of tidal and pluvial events

"Greenfield runoff rate" The rate of runoff that would occur from the site in its undeveloped and therefore undisturbed state.

"Impermeable area" all paved or roof areas that are not specifically designed to be permeable.

"Maintenance" means the on-going maintenance of all elements of the sustainable drainage system (including mechanical components) and will include elements such as; on-going inspections relating to performance and asset condition assessments, operation costs, regular maintenance, remedial works and irregular maintenance caused by less sustainable limited life assets.

"Operation" Activities which are required to ensure that control components function as per the approved design

"Peak rate of runoff" is the highest rate of flow from a defined catchment area assuming that rainfall is uniformly distributed over the drainage area, considering the entire drainage area as a single unit and estimation of flow at the most downstream destination(s) only

"Previously developed land" refer to definition in Annex 2 NPPF. This may be referred to as brownfield development.

"Single property drainage system" This is the constituent parts of a drainage system within the curtilage of a single property and that only receive flows from that property.

"Structural integrity" Ensures that a system fulfils its design function

"Unacceptable deformation" Changes, failure or damage that prevents the design function of the component or drainage system such that safety and/or flood risk is adversely impacted.

"Urban Creep" This is the conversion of permeable surfaces to impermeable over time e.g. impermeable surfacing of front gardens to provide additional parking spaces, extensions to existing buildings, creation of large patio areas. The consideration of urban creep (is best) assessed on a site by site basis but is limited to residential development only.

It is important that the appropriate allowance for urban creep is included in the design of the drainage system over the lifetime of the proposed development. The allowances set out below are applied to the impermeable area within the property curtilage:

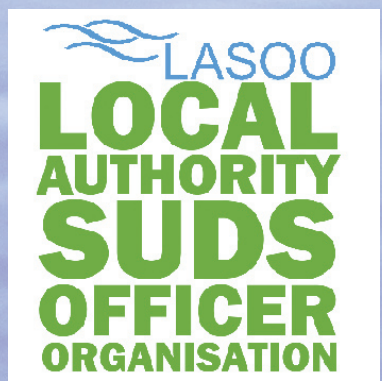
Residential development density Dwellings per hectar	Change allowance % of impermeable area
≤ 25	10
30	8
35	6
45	4
≥ 50	2
Flats & apartments	0

Note where the inclusion of the appropriate allowance would increase the total impermeable area to greater than 100%, 100% should be used as the maximum.

"Viability" as used in the explanatory notes reflects economic viability as defined within the Town and Country Planning Act and utilised by Local Planning Authorities.

"Water body" A manageable unit of surface water, being the whole (or part) of a stream, river or canal, lake or reservoir, transitional water (estuary) or stretch of coastal water. A 'body of groundwater' is a distinct volume of groundwater within an aquifer or aquifers.

'Developers have a vital role to play in delivering the outcomes of risk management strategy. Planning authorities should take necessary regard of not just the statutory planning framework and the National FCERM Strategy, but also the Local Flood Risk Management Strategy. The Local Strategy should be considered as supplementary planning guidance (SPG) and therefore form a material consideration in the planning process. In so doing, future developments will take proper regard of the local flood risk management strategy including the risk of flooding from surface water, groundwater and ordinary watercourses. Information on principally coastal and fluvial flooding may be found in the Strategic Flood Risk Assessment, although some also seek to address surface water flood risk'.


LASOO
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AUTHORITY
SUDS
OFFICER
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