Oxfordshire Lead Local Flood Authority

OXFORDSHIRE COUNTY COUNCIL

LOCAL STANDARDS AND GUIDANCE FOR SURFACE WATER DRAINAGE ON MAJOR DEVELOPMENT IN OXFORDSHIRE

V1.2 December 2021

Document Status

This guidance document has been adopted by Oxfordshire County Council in its role as Lead Local Flood Authority as policy in relation to the review of Planning Applications. Therefore, this document forms a material planning consideration.

This guide is a living document, meaning new information and updates will be continually added as they emerge. This is especially important as this edition of the guide precedes any implementation of Schedule 3 of the Flood and Water Management Act (2010).

Version

Version Number	Date	Purpose	Key amendments
1.0	29th November 2018	Final published version	N/A
1.1	26th October 2018	Update to Local Standards	
1.2	14th December 2021	Update to Local Standards	Climate change allowances and type of documents required upon completion.

CONTENTS

1 INTRODUCTION

New planning regulations came into force in April 2015, designed to ensure, where possible, that Sustainable Drainage Systems (SuDS) are used on all new developments in England.

Lead Local Flood Authorities have also become statutory consultees to the planning process, to assess major planning applications for their surface water drainage implications, as an alternative to implementation of the 'SuDS Approval Body' as set out in Schedule 3 of the Flood and Water Management Act (2010).

Therefore, new developments now have to move away from traditional below ground piped drainage systems to more efficient, resilient, and flexible sustainable drainage systems. SuDS manage rainwater runoff in a way that is more similar to the natural runoff process retaining water at or near the ground surface.

To produce a holistic development proposal with integrated drainage, greater consideration of drainage at the master planning stage is required, including the interplay between drainage and all aspects of land use, amenity, and biodiversity. It is essential that early consultation with all stakeholders is undertaken before the masterplan is fixed and site layouts are developed.

1.1 WHY SUDS?

Within true SuDS, rainwater is dealt with close to where it falls (at source), allowing as much water as possible to either evaporate or soak into the ground. Remaining runoff is then drained to the nearest water body, ideally via other forms of SuDS, at the same rate and volume or lower as would naturally have occurred prior to development. During this process, SuDS reduce pollutants in the water, such as hydrocarbons, nutrients and heavy metals, by filtering and treating runoff. This ensures that the water soaking into the ground and discharging to nearby watercourses or sewers is cleaner, protecting water quality and wildlife.

Underground piped systems quickly divert surface water runoff to local watercourses or the sewer system without the chance to soak into the ground and enter the natural drainage system. This reduces the amount of groundwater recharge, which can in turn result in disruption to base flow in streams and rivers.

Underground piped systems are also prone to blockage, posing a risk of flooding, as well as directing pollutants, such as oil, organic matter, and toxic metals, straight to the natural environment without the opportunity to trap, breakdown or remove them. Thus, draining developed areas in this way can increase the risk of downstream flooding and lead to a deterioration of water quality.

Keeping water at ground within SuDS means any problems with the system can be identified quicker and easier than with a conventional system and are generally cheaper and more straightforward to rectify.

1.2 PURPOSE OF THIS GUIDE

This Guide is intended to assist developers in the design of surface water drainage systems, and to support Local Planning Authorities in considering drainage proposals for new developments within Oxfordshire.

From 15th April 2015, Oxfordshire County Council as the Lead Local Flood Authority (LLFA) became a statutory consultee of the planning application process, taking on a role previously discharged by the Environment Agency.

This guide sets out standards that are applied by the LLFA for new development proposals in Oxfordshire, which reflect the National Non-Statutory Technical Standards for SuDS. This guide provides Oxfordshire-specific information on the planning, design, and delivery of surface water drainage, designed to reduce the risk of flooding and maximise environmental gain, including water quality, water resources, biodiversity, landscape and amenity. The guide also aims to ensure that all new developments and redevelopments in the county are designed to mitigate and adapt to the effects of climate change.

The SuDS philosophy and concepts within this document are based upon and derived from the updated SuDS Manual (CIRIA C753), supplemented by SusDrain, and additional resources specific to Oxfordshire. **Appendix A** provides information on these and other useful SuDS references. Users of this guide should familiarise themselves with the range of additional resources available and incorporate advice

from all sources into their surface water drainage proposals.

This guide should be used in conjunction with the above national documents and all relevant legislation and guidance. Consequently, early consultation with all stakeholders should be undertaken to identify potential competing aspirations and agree outline strategies and site-specific techniques.

This guide also sets out the information that is expected to be submitted with planning applications to enable an efficient review and approvals process.

1.3 WHO IS THIS GUIDE FOR?

This guide is primarily for use by developers, designers and consultants who are seeking guidance on the LLFA's local requirements for the design of surface water drainage in Oxfordshire. The guide will also be used by LLFA officers to ensure a consistent approach is taken when assessing plans and designs as part of the planning application process.

1.4 LEGISLATION

Schedule 3 of the **Flood and Water Management Act 2010** (http://www.legislation.gov.uk/ukpga/2010/29/contents) would have required LLFAs to determine applications for drainage systems against national standards and then adopt those SuDS serving more than one property. However, this part of the Act has not been implemented, and it is understood that the Government has no plans to do so for the foreseeable future.

In December 2014, the government announced that from the 6th April 2015 they would strengthen existing planning policy by making SuDS a material consideration for major development.

The National Planning Policy Framework (NPPF), which was updated in July 2021 provides specific principles on flood risk (Section 14, from page 45). National Planning Practice Guidance (NPPG) provides further advice to ensure new development will come forward in line with the NPPF.

Paragraph 159 states; "*Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere."*

As stated in Paragraph 160 and 161 of the NPPF, we will expect a sequential approach to be used in areas known to be at risk now or in the future from any form of flooding.

The **Planning Practice Guidance** also supports the use of SuDS, emphasizing the hierarchy of discharge of runoff, and stating that *"For major developments (e.g. of ten or more homes or major commercial developments), and for all developments in areas at risk of flooding, sustainable drainage systems should be used"*.

In March 2015, government laid a **statutory instrument** making the LLFA a statutory consultee by adding the consultation requirement to Schedule 4 of the Development Management Procedure Order, effective from 15th April 2015.

The **Non-Statutory Technical Standards for Sustainable Drainage** relate to the design, construction, operation and maintenance of SuDS, and have been published as guidance for those designing schemes.

A full summary of the relevant legislation and guidance, including local policy, is provided in **Appendix B**.

2 ROLES AND RESPONSIBILITIES FOR SURFACE WATER DRAINAGE IN OXFORDSHIRE

2.1 INTRODUCTION

The Local Planning Authorities (LPAs) must consult the Lead Local Flood Authority (LLFA) (the County Council for Oxfordshire) on all major planning applications as defined below:

> The definition of "**Major development**" is taken from the Town and Country Planning Act 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;

The LLFA will review drainage strategies and assessments for these applications and provide advice to the LPA on whether the development should be approved on surface water drainage grounds.

The LLFA encourages all new development and redevelopment that requires planning permission to use SuDS to reduce flood risk, improve water quality and present options for biodiversity and public amenity. This is consistent with existing national guidance and local planning policy.

The LLFA offer a Pre-Application advice service, details of which can be found here. The LLFA advocate developers take advantage of this service.

2.2 ROLES & RESPONSIBILITIES

2.2.1 LOCAL PLANNING AUTHORITIES (LPAS)

In Oxfordshire, the following authorities are LPAs:

- Cherwell District Council
- Oxford City Council
- South Oxfordshire District Council
- Vale of White Horse District Council
- West Oxfordshire District Council
- Oxfordshire County Council.

As LPAs, the District Councils in Oxfordshire are responsible for preparing Local Plans, outlining proposals for growth and determining planning applications. Under the Flood and Water Management Act, LPAs also have a duty to cooperate and share information in order to reduce flood risk.

LPAs must consult the LLFA in determining 'major' planning applications; and then inform the LLFA of its determination of the planning application.

In considering a development that includes a sustainable drainage system, the LPA will need to be satisfied that the proposed minimum standards of operation are appropriate and that there are clear arrangements in place for ongoing maintenance.

The decision on whether a sustainable drainage system would be appropriate in relation to a particular development proposal is a matter of judgement for the LPA. In making this judgement the LPA can seek advice from the relevant flood risk management bodies, principally the LLFA, including on what sort of sustainable drainage system they would consider reasonably practicable. The judgement of what is reasonably practicable should be by reference to the non-statutory technical standards and take into account design and construction costs.

Please see **Appendix H, LPA Boundaries**

2.2.2 DEVELOPERS/APPLICANTS

Developers must submit surface water drainage details and proposals to the LPA for all construction work that will have an impact on drainage of a site. Applications should be in line with the National Non-Statutory Technical Standards for SuDS, should consider the Local Standards provided in this document, and should include all the required information about the site including the surface water drainage proposals, in accordance with the lists in **Appendix C** for Outline applications, **Appendix D** for Full applications, **Appendix E** for Reserved Matters applications, and **Appendix F** for Discharge of Conditions applications, to ensure that the LLFA can advise the LPA appropriately.

Applicants are strongly advised to carry out pre-application consultations with the LPA at the master planning stage. They should ensure layouts make space for appropriate SuDS techniques, to ensure that the development maximises benefits in relation to reduction of local flood risk.

Where it is proposed to use a traditional drainage system, the onus is on the developer to provide evidence to demonstrate that SuDS are not appropriate for the particular development.

The onus is also on the developer to demonstrate that the works will be adopted (private or public) and maintained for the lifetime of the development.

2.2.3 CONSULTEES FOR DRAINAGE AND FLOOD RISK PLANNING APPLICATIONS

2.2.3.1 OXFORDSHIRE COUNTY COUNCIL (OCC) AS THE LEAD LOCAL FLOOD AUTHORITY (LLFA)

Under the Flood and Water Management Act (2010) OCC as LLFA is responsible for the coordination of the management of flood risk from surface water, ordinary watercourses and groundwater in Oxfordshire.

In considering planning applications for major developments, LPAs must consult the County Council in their role as LLFA. The LLFA will provide technical advice on the surface water drainage strategies and designs put forward.

For the avoidance of doubt OCC as LLFA will not comment on the following aspects of an application:

- Water quality
- Contaminated land / landfill
- Risk of flooding from groundwater
- Foul Sewerage Infrastructure Provision
- Landscape
- Visual impact
- Historical aspects
- Biodiversity and ecological impacts
- Fisheries
- Water Framework Directive
- Amenity / Health and Safety
- Navigation

unless they appear to have a direct impact on the potential performance of the SuDS. This responsibility remains with the LPA.

2.2.3.2 ENVIRONMENT AGENCY

The Environment Agency (EA) is also a statutory consultee to planning applications where:

- The proposed drainage system involves the discharge of water within 20m of a main river[1] either directly or indirectly;
- The development is within an identified flood zone (2 or 3) as shown on the online flood map for planning[2]; or
- The development is within an Area with Critical Drainage Problems (ACDPs) as notified to the Local Planning Authority by the EA. These are defined areas that flood regularly and are sensitive to increased flows and where new development could impact on the management of EA assets.

There are no Areas with Critical Drainage problems in Oxfordshire. However, Strategic Flood Risk Assessments (SFRAs) produced by the City and District Councils may contain locally produced information and have identified areas at greater risk as Critical Drainage Areas.

- EA consultation and standing advice related to planning applications can be found at https://www.gov.uk/government/organisations/environment-agency.

The EA provide a free, preliminary opinion which will outline their position and any other environmental issues regarding a proposed development. Any further

[1] https://www.oxfordshirefloodtoolkit.com/risk/
[2] https://www.oxfordshirefloodtoolkit.com/risk/

advice, including assessment of reports, follow up meetings or site visits, is offered as part of a paid-for service. Please email planning THM@environment-agency.gov.uk for further information.

Under the Environmental Permitting (England and Wales) Regulations 2010, a permit may be required from the Environment Agency for any proposed works or structures in, under, over or within eight metres of the top of the bank of designated 'main river'. This was formerly called a Flood Defence Consent. Some activities are also now excluded or exempt. A permit is separate to and in addition to any planning permission granted. Further details and guidance are available on the GOV.UK website at https://www.gov.uk/topic/environmental-management/environmental-permits.

2.2.3.3 SEWERAGE UNDERTAKERS

The relevant sewerage undertaker (Thames Water, Anglian Water or private owner) may comment on applications where the surface water drainage system is proposed to discharge into the sewerage system.

The sewerage undertaker will provide information about the availability and capacity of the sewerage network. The sewerage undertaker may have to carry out a capacity study (possibly at the applicants expense) before it can advise on the available capacity, which may include permitted rate of discharge or point of connection.

The sewerage undertaker may adopt and maintain certain elements of the drainage system. Consequently developers/applicants are strongly advised to undertake early consultation with the sewerage undertaker. Please see **Appendix H**, Water Authorities of Oxfordshire.

- **Thames Water**: full details of their adoptions requirements and processes and contact details can be found at www.thameswater.co.uk/developers/592.htm
- **Anglian Water:** full details of their adoptions requirements and processes and contact details can be found at www.anglianwater.co.uk/developers/

  Within Oxfordshire Anglian Water Services Limited is the sewerage undertaker for the parishes of Ardley, Cottisford, Finmere, Fringford, Fritwell, Godington, Hardwick with Tusmore, Hethe, Mixbury, Newton Purcell with Shelswell, Somerton, Stoke Lyne and Stratton Audley within the Cherwell District Council only.
- **Seven Trent Water** full details of their adoptions requirements and processes and contact details can be found at https://www.stwater.co.uk/building-and-developing/contact-developer-services/

  Within Oxfordshire Severn Trent Water is the sewerage undertaker for all or part of the parishes of Sibford Ferris, Sibford Gower, Swalcliffe and Rollright
- **Private Owner**: please contact the owner direct for advice.

Please note that surface water should never be discharged into the foul sewer system.

2.2.3.4 THE HIGHWAY AUTHORITY

OCC is also the Local Highway Authority and is a statutory consultee on all planning applications.

Oxfordshire County Council as Highway Authority may consider the adoption of SuDS features with commuted sums for maintenance, provided that they only take runoff from the highway and are located within the prospective highway and have suitable access arrangements. SuDS features which are located adjacent to prospectively adoptable highway carriageways may, subject to certain criteria and a commuted maintenance sum, form part of the works adopted under Section 38 of the Highways Act 1980.

Any features that may hold or retain water must be located with a minimum clearance of 5m between the retained water extent and the limit of the adjacent existing or prospective operational highway (back of footway/verge). Clearances less than 5m for soakaway features may be acceptable subject to site specific considerations related to geological testing, water table assessment and infiltration assessments.

If highway-only SuDS features are being considered, these must be discussed and agreed with Oxfordshire County Council as Highway Authority before promoting such a solution as part of a planning application. The use of highway-only SuDS features should in general be avoided as this creates potential duplication of systems and inefficient use of available land. Such an approach may, therefore, be limited to sites where surface water sewerage is only required for highway

runoff, or for highway-only development such as bypasses.

Oxfordshire County Council as Highway Authority will not accept any new connections to its existing drainage systems. OCC will not accept surface water from private systems.

Developers should note that private water is not permitted to be discharged into OCC owned and maintained drainage assets, for example Highways Drainage systems.

Furthermore, developers are expected to be able to demonstrate that their proposals do not lead to an increase in surface water runoff onto the local road network.

Any piped drainage system that may cross an existing or proposed adoptable highway would be subject to an appropriate license. Pre-application discussions with Oxfordshire County Council as Highway Authority are, therefore, highly advisable. For further information please email https://www.oxfordshire.gov.uk/cms/content/contact-highways

For the avoidance of doubt, the LLFA with regards to drainage and SuDS approval is independent of Oxfordshire County Council as Highway Authority with regards to highway development control, highway agreements and highway adoptions.

2.2.3.5 National Highways

National Highways will not accept any new connections to its existing drainage systems, and it would expect developers to demonstrate that their proposals would not lead to an increase in surface water run-off onto the strategic road network, as per requirements in Department for Transport Circular 02/2013: 'The strategic road network and the deliverability of sustainable development.

2.2.3.6 THE CANAL AND RIVER TRUST

The Canal and River Trust is a statutory consultee on all planning applications where the "*development is likely to affect:*

- *any inland waterway (whether natural or artificial) or reservoir owned or managed by the Canal & River Trust; or*
- *any canal feeder channel, watercourse, let off or culvert.*

which is within an area which has been notified for the purposes of this provision to the local planning authority by the Canal & River Trust."

The Oxford Canal is managed by the Canal and River Trust in Oxfordshire. Where it is proposed to discharge surface water runoff into a canal or associated feature, early discussions will be required to determine any capacity limitations for discharge rates

2.2.3.7 THE INTERNAL DRAINAGE BOARD

The Internal Drainage Board (IDB) must be consulted on all applications where the surface water drainage system may directly or indirectly involve the discharge of water into an ordinary watercourse within the Board's district.

The administrative area of Oxfordshire contains only one IDB, known as the Bedford Group of Drainage Boards. The IDB covers a small area to the north east part of the County, north of Bicester. Appendix H includes a map that shows the extent of the IDB catchment area within Oxfordshire.

This consortium provides advice and direction to local authorities as part of the planning application process in relation to flood and water management, and also currently adopts and maintains SuDS within their area. For further details please contact the IDB via http://www.idbs.org.uk/

3 THE PLANNING APPLICATION PROCESS

3.1 INTRODUCTION

This section sets out the various processes and procedures that should be followed to ensure successful implementation of surface water drainage, and specifically SuDS, within a development.

3.2 FLOOD RISK ASSESSMENT VS. DRAINAGE ASSESSMENT

NPPF footnote 20 explains that a site specific **Flood Risk Assessment** (FRA) is required for developments of 1 hectare or greater in Flood Zone 1; all developments in Flood Zones 2 and 3 or in an area within Flood Zone 1 notified as having critical drainage problems; and where development or a change of use to a more vulnerable class may be subject to other sources of flooding. The FRA should, amongst other things, help demonstrate that priority is being given to sustainable drainage systems in areas at risk of flooding.

A **Drainage Assessment** is a specific requirement set by the LLFA for all major applications in Oxfordshire, regardless of whether an FRA has been prepared. The Drainage Assessment may form part of the FRA or vice versa. A Drainage Assessment will ensure industry best practice is applied to the drainage strategy of all major developments and should include information on the detailed design, management and maintenance of surface water management systems.

Pre-application

The LLFA strongly recommends early consideration of SuDS when formulating the development design and layout, so as to successfully integrate suitable, efficient SuDS, which offer wider environmental benefits.

Pre-application discussions should be a collaborative approach with the LPA, Oxfordshire County Council as Highway Authority and where appropriate/ applicable the Environment Agency and other consultees.

SuDS provide a valuable opportunity to enhance the environmental quality of a development and can help developers "incorporate biodiversity improvement in and around developments" as required by the National Policy Planning Framework (paragraph 175 d). The LLFA strongly encourages SuDS designers to consider how their schemes can deliver biodiversity, landscape and other green infrastructure benefits in addition to meeting the site drainage requirements

The following bodies should be consulted at the pre-application stage, where necessary:

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- **The Environment Agency** for planning applications related to their statutory duties on flood risk, protection of land and water quality, mining operations, waste regulation and fisheries.
- **The LPA** for initial proposals relating to the design of the site and for other key planning, Building Regulation and Code for Sustainable Homes/ BREEAM related issues. The LPA will also be able to advise on matters such as integrated blue/green corridors; appropriate land use areas; urban design; arboriculture; biodiversity and ecology considerations; amenity areas; allocation of play areas and types of recreation facility; and suitable landscaping and planting schemes, all of which should be compatible with the functionality of SuDS.
- **The relevant sewerage undertaker** for availability and capacity of existing sewerage networks and to obtain agreement for the point of connection where necessary. A sewer capacity study may be required (possibly at the applicant's expense) prior to any decision on the rate of discharge or point of connection. It may also be possible to requisition an outfall. The undertaker should also be contacted if it is proposed for any of the drainage system to be adopted.
- **Third party land owners** where there may be requirements to cross land and/or obtain a right to discharge, to enable discharge of drainage to a

watercourse or sewer off-site. Evidence of consent must be provided.

- **An ecology expert** for proposed development which may have biodiversity, habitat and protected species issues relating to both the creation of SuDS and the ongoing maintenance essential to ensuring the long term functionality of SuDS.
- **Oxfordshire County Council in its role as Highway Authority** where the proposed SuDS may interact with or fall within the existing or adoptable road network or is proposed to outfall to an existing highway drainage system.
- **National Highways** where the proposed SuDS may interact with or fall within the existing or adoptable strategic (Trunk) road network or is proposed to outfall to an existing strategic highway drainage system.
- **Historic England and an archaeological/ heritage expert** where the proposed development, such as excavations for attenuation storage, may have an impact on archaeology or historic features.

3.3 Outline Applications for Phased Developments

For outline applications for phased developments, to ensure space is allocated and a satisfactory SuDS scheme can be delivered for a phased development, the LLFA will require applicants to produce a Drainage Strategy with which all Reserved Matters applications would need to comply. The Drainage Strategy should contain sufficient detail of typical development layouts to indicate the likely location of all the SuDS features and connecting flow paths (pipes, swales, ditches etc.). It should clearly identify peak discharge rates and total attenuation storage volumes required within each package of the overall development. Planning conditions should be applied to the outline consent to ensure that there are no interim phases developed that are unprotected or not served by an appropriate drainage system. Phases can only progress if adequate flood mitigation and drainage measures are in place for that particular phase.

3.4 Outline and Full Planning Applications

Effective and sustainable surface water runoff management should be considered from the outset, and integrated throughout the development. Although specific development information may be limited at outline planning stage, the application will still need to give consideration to, and make a commitment to, the requirements of this guide.

Outline and full planning applications should be accompanied by a Flood Risk Assessment or Drainage Strategy. Failure to provide all the necessary information may result in a delay to the planning process, as the LLFA will be required to recommend refusal of the application on the basis of inadequate information. **Appendix C** and **Appendix D** set out the full requirements for a surface water drainage submission for each type of application. The key requirements are set out below:

- Demonstration that the SuDS Management Train has been appropriately applied.
- Identification of a positive outfall for the drainage. For discharge to ground, this would include soakaway testing results; for discharge to a water body this would include landownership and other agreements; and for discharge to sewer this would include agreement of the maximum allowable discharge rates from the relevant sewerage provider.
- Demonstration that National Non-Statutory Technical Standards for SuDS have been met by the drainage design.
- A SuDS Management Plan which states who will own and maintain all elements of the drainage system, supported by a maintenance plan.
- If a traditional drainage solution is proposed, evidence to demonstrate why SuDS are not viable for the proposed development.
- A piped system to one Suds feature (e.g. pond) is not an acceptable Suds system, a developer should include Suds features throughout the surface drainage system in accordance with a suds train.

Once the LLFA has received the application from the relevant LPA, the LLFA will provide a formal response to the LPA within 21 days. The LPA will then use this response to determine whether or not to approve the

application, and whether any appropriate conditions should be attached to the approval.

3.5 Reserved Matters Applications and Planning Conditions

The LLFA may recommend to the LPA that planning conditions are attached to an approved outline, full or reserved matters application. This will depend on the level of detail available at the application stage and the nature/extent of the development proposal.

Where a surface water condition has been requested on an outline permission, but this has not been discharged before the reserved matters application, it should be noted that if the layout of the development needs changing to account for the surface water scheme, a revised reserved matters application may be required to achieve satisfactory surface water drainage arrangements without increasing flood risk off site.

All Reserved Matters applications will need to be supported by an FRA and/or Drainage Strategy. Otherwise, there is a risk that drainage solutions proposed at a later stage may have an impact upon the layout and arrangements, including landscaping. As such, it may be prudent to explore such details concurrently with any Reserved Matters Application. This may avoid subsequent changes or constraining the drainage solution unnecessarily with a layout and landscaping would have been approved before drainage details are available. Full details of the requirements for Reserved Matters applications are set out in **Appendix E**.

3.6 Adoption and Maintenance

The LLFA will not adopt or maintain any SuDS features.

The responsibility to ensure that adequate long-term maintenance of any drainage system can be delivered remains with the developer.

The LLFA may require evidence and documentation as part of the planning process (generally as part of a planning condition) to demonstrate that appropriate agreements are in place (at least in principle) for the entirety of the drainage system to be adopted and maintained for the lifetime of the development. This is particularly important for SuDS in multi-functional spaces.

There are four main options open to developers for the adoption and maintenance of surface water drainage including SuDS:

1. The local sewerage undertaker may adopt and maintain certain features;
2. Adoption could be agreed through a Section 106 (of the Town and Country Planning Act 1990) agreement/separate agreement with the City, district, town or parish council where the developer would pay the Commuted Sums for the maintenance;
3. The developer may set up or use a service management company;
4. Adoption and maintenance can be arranged with private individuals (only where the SuDS serve individual properties).

In addition, the highways authority may adopt and maintain SuDS that serve only the highway. The final solution for a site is likely to be a combination of the above.

The adoption and maintenance of all surface water drainage within a development would have to be discussed and agreed with the LPA.

4 OPPORTUNITIES, CONSTRAINTS AND CONSIDERATIONS FOR SUDS OXFORDSHIRE

4.1 GENERAL

Oxfordshire extends over an area of approximately 2,605 km^2 and has a population of more 683 000 people. The county is predominantly rural, with almost 75% of the land devoted to agricultural use and almost 25% with three 'Areas of Outstanding Natural Beauty', including the Chiltern Hills, the Cotswolds and the North Wessex Downs.

The topography is dominated by the major river valley of the Thames with its many tributaries and predominantly comprises low rolling hills. White Horse Hill is the highest point, at 260m above Ordnance Datum

The following section provides an overview of the potential opportunities and constraints to SuDS within Oxfordshire, including geology, topography, hydrology, rainfall, historic environment, landscape and townscape character, and nature conservation.

4.2 GEOLOGY

The rocks of Oxfordshire are sedimentary in origin, and were deposited for the most part in shallow seas Geology comprises a series of rocks of Jurassic and Cretaceous age that are gently tilted to the south-east, so that the oldest rocks occur in the north-west and the youngest in the south-east. Blue Lias clays which stretch from the Dorset coastline across the country run across the north and centre of the county near Banbury and Oxford to the Yorkshire coast. They are the oldest of Oxfordshire's rocks. The oolitic limestone of the Cotswolds in the northwest is followed progressively by overlying bands of Oxford clays, mudstone, siltstone and sandstone culminating in chalk to the south and southeast which forms the hills of the North Wessex Downs and the Chilterns.

The British Geological Survey (BGS) have developed a map that provides an indication of the potential suitability of the subsurface for infiltration SuDS. The 'Infiltration SuDS Map: Summary' is derived from a combination of 15 BGS national datasets and

comprises four GIS layers[3]:

- significant constraints;
- potential for drainage;
- potential for instability; and
- protection of groundwater quality.

The 'Infiltration SuDS Map: Summary' provides screening-level data with an indication of the likely suitability of the ground for infiltration. It does not provide information about the properties of the subsurface. Please note that this map is only appropriate for strategic level decisions and is not a replacement for a soakaway test as part of site investigations.

It should be noted however that there are many SuDS options that do not involve/require infiltration, which may be suitable in these areas. Constraints to infiltration do not mean constraints to implementation of SuDS.

4.3 HYDROLOGY

Oxfordshire is almost entirely within the Thames River Basin District (96.6%) of the Environment Agency's South East Region. Small areas drain to the Anglian (2.6 %) and Severn (0.8 %) River Basin Districts.

The Cherwell management catchment consists of the river Cherwell and its tributaries

Other major rivers of Oxfordshire are the Leach, Windrush, Evenlode, Glyme, Ray, and Ock

4.4 RAINFALL

Oxfordshire receives some of the lowest average annual rainfall volumes in the UK, ranging from between 600mm to 700mm.[4]

The Thames River Basin District is one of the driest in the UK with annual rainfall levels below the national average. Rainfall quantities are generally low and

[3] http://www.bgs.ac.uk/products/hydrogeology/infiltrationSuds.html
[4] Average Annual Rainfall (1961-1990) FEH

drought conditions are a risk. Developers should consider opportunities for rainwater harvesting and recycling in these water-stressed areas, and infiltration wherever possible to maximise groundwater recharge.

Due to the additional datasets that have been added to the Flood Estimation Handbook (FEH) since design rainfall events were developed originally in the Flood Studies Report (FSR) (NERC, 1975), rainfall depths obtained using FEH show significant differences from those obtained from FSR in some parts of the country. Within Oxfordshire, rainfall depths are often greater using more up to date FEH datasets than those using FSR, therefore for various storm events, greater run-off is produced and additional attenuation is likely to be required. As FEH rainfall data is more up to date, calculations should use FEH2013 data for surface water drainage design, except where the critical storm duration is less than 60 minutes, as it is recognised that FEH data is less robust for short duration storms. If FEH rainfall data is not used as described above, then sensitivity testing to assess the implications of FEH rainfall must be provided.

4.5 Historic Environment

The LLFA will not comment on heritage matters. This responsibility remains within other areas of the planning process. However, it is advised that the consideration of SuDS in relation to the historic environment take place as part of a multi-disciplinary design team approach.

Information and advice on the historic environmental significance of areas affected by new SuDS, and the mitigation that may be needed to reduce their impacts on the historic environment, should be sought at the master planning or land use planning stage from Oxfordshire County Council's Historic Environment Record (https://www.oxfordshire.gov.uk/cms/content/historic-environment-record) and, where relevant, Historic England (http://www.historicengland.org.uk/).

4.6 Landscape and Townscape Character

The LLFA will not comment on landscape and townscape implications of the proposal. This responsibility remains within other areas of the planning process. However, it is advised that the consideration of SuDS in relation to landscape and townscape character take place as part of a multi-disciplinary design team approach. SuDS can provide opportunities for improvements in local landscape quality, and these should be sought where possible.

Early consultation with the LPA should be undertaken at the master planning or land use planning stage to ensure SuDS are integrated with the landscape and townscape character.

Further information on landscape character types and areas can be found in the county-wide Oxfordshire Wildlife and Landscape Study (OWLS)

http://owls.oxfordshire.gov.uk/wps/wcm/connect/occ/OWLS/Home/

and the county-wide Historic Landscape Characterisation study

https://www.oxfordshire.gov.uk/residents/environment-and-planning/archaeology/landscape-characterisation

Reference must also be made to district level landscape character assessments available from the relevant district council

4.7 Nature Conservation

The LLFA will not comment on nature conservation aspects of the application. This responsibility remains within other areas of the planning process.

SuDS should incorporate opportunities to improve biodiversity where possible. General information about statutory designated international and national areas can be found at Nature on the Map (http://magic.defra.gov.uk/). International and national designations are supplemented by a network of non-statutory, locally identified sites of county value for nature conservation known as Local Wildlife Sites. More detailed and up to date information on sites and species of biodiversity and geological interest in Oxfordshire should be obtained from the Thames Valley Environmental Records Centre (www.tverc.org).

Further information on planning for biodiversity can be found at

https://www.oxfordshire.gov.uk/residents/environment-and-planning/countryside/natural-environment/environmental-policy-and-planning/biodiversity-and-planning

Schemes should take account of protected and priority species and habitats in the vicinity of SuDS both in the

initial design and when considering long-term maintenance.

Where a developer wants to create a habitat that is likely to support a legally protected species, the system needs to be oversized and on a larger footprint to enable maintenance to take place whilst maintaining the minimum standard of service.

4.8 Specific SuDS Features

4.8.1.1 Green roofs

The use of brown/green roofs should be for betterment purposes (in terms of habitat and water quality) and these only a have limited capacity as provision of on-site storage for surface water. This is because their hydraulic performance during extreme events is similar to a standard roof (CIRIA C753).

Green and brown roofs would however be accepted as a means of removing the first 5mm of rainfall in terms of water quality protection.

Figure 1 An example of a sedum green roof (photo: © Oxford Green Roofs ltd)

4.8.1.2 Rainwater harvesting

Rainwater from roofs and hard surfaces can be stored and used in and around properties. These systems can work to reduce the rates and volumes of runoff, thereby providing betterment on the site. However the rainwater harvesting volumes are not considered to contribute to the overall attenuation volume for a SuDS system as it cannot be guaranteed that the storage will be empty prior to rainfall.

Rainwater harvesting would however be accepted as a means of removing the first 5mm of rainfall in terms of water quality protection.

4.8.1.3 Infiltration SuDS including Soakaways

The preferred means of surface water disposal is through infiltration to the ground. Only where the subsurface geology is not suitable for infiltration should other runoff destinations be considered. The location of infiltration SuDS is likely to be different to other forms of SuDS. Consequently, infiltration SuDS should be determined in advance of the masterplan or land use allocation. Thus, permeability tests need to be carried out at the outset.

Infiltration testing should be undertaken, and infiltration drainage designed and constructed, in accordance with BRE Digest 365 (2016) and CIRIA Report 156.

To ensure protection of groundwater quality there should be a minimum of 1.0 m clearance between the base of infiltration SUDS and peak seasonal groundwater levels. We consider that deep bore and other deep soakaway systems are not appropriate in areas where groundwater constitutes a significant resource (that is where aquifer yield may support or already supports abstraction). Deep soakaways increase the risk of groundwater pollution.

Please refer to 'The Environment Agency's approach to groundwater protection' (March 2017 version 1.0), particularly position statements G1 and G9 to G13.

Soakaways can be used as a source control feature of the SuDS train and for discharge of surface water. They are normally circular or square excavations, filled with aggregate or lined with brickwork, or pre-cast structures surrounded by granular backfill. Aggregate filled chambers are not considered acceptable by the LLFA as they present too great a risk of short-term failure due to difficulty in maintenance. House rubble type soakaways, borehole soakaway systems and rubble and/or modular cell filled trench systems are not considered acceptable by the LLFA unless pre-treatment to remove silt is provided.

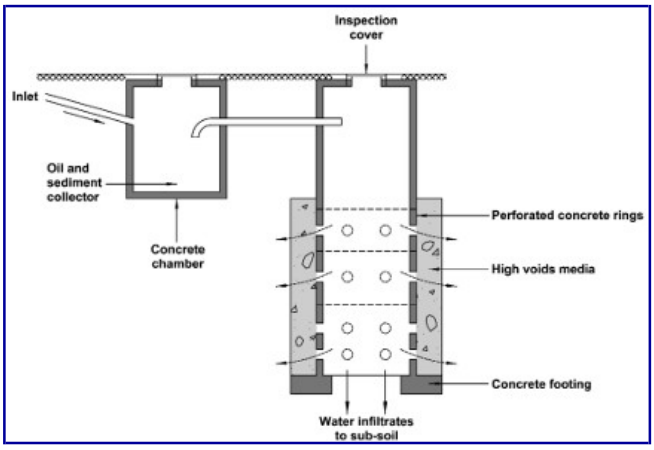

Figure 2 Typical Cross Section of Soakaway

4.8.1.4 Underground (e.g. Geocellular) Storage

Justification for the use of underground storage should be provided, given the additional maintenance burden that this form of storage requires, and the lack of additional benefits provided compared to more natural solutions.

Only systems that do not allow silt to enter will be acceptable as an infiltration drainage feature, unless a robust solution for entry, inspection and maintenance is provided. These should avoid confined spaces issues. Geocellular systems under roads where the roads will be subject to construction traffic will not be acceptable unless evidence is provided of their suitability for such loading.

Figure 3 Geocellular system under a car park

4.8.1.5 Filter Strips

Filter strips are gently sloping strips of grass or dense vegetation with a uniform gradient, which improve the quality of the runoff by filtering out sediments and some contaminants. Filter strips are not generally appropriate on steep sites, or where there is a risk of groundwater contamination.

In some situations, SuDS may provide an opportunity to introduce new trees into the landscape. Soil characteristics that support good drainage also provide good conditions for tree root growth, which itself can help to retain soil porosity. The incorporation of engineered tree soils and interlinked tree pits into SuDS should be considered particularly in urban areas.

Figure 4 An example of filter strip.

4.8.1.6 Infiltration and Filter Trenches

Infiltration and filter trenches are shallow excavations filled with rubble or stone that creates temporary subsurface storage for infiltration or filtration.

Figure 5 An example of infiltration trench

4.8.1.7 Swales

Swales are shallow vegetated linear depressions with a flat base in which water can be stored or conveyed and pollutants can be removed. Swales are not generally appropriate on steep sites but can be used with check-dams to slow flow rates and provide attenuation. They can be used on contaminated sites if they are suitably lined.

Figure 6 An example of a swale.

4.8.1.8 Detention Basins and Retention Ponds

Detention basins and ponds are designed to store and attenuate runoff from a site, allowing a restricted outfall to watercourse or sewer, or for infiltration. Basins are often designed to be dry for multi-use, whereas ponds have a permanent water level.

Figure 7 Example of a retention pond.

Figure 8 Example of a detention basin.

Figure 9 Example of a dry basin.

4.8.1.9 Permeable and Pervious Pavements

Permeable and pervious surfaces are suitable for areas of private pedestrian, parking, or lightly trafficked areas, to allow runoff to permeate through the surface. Permeable paving can be used in almost all developments – if there are restricted infiltration rates or contamination risks, the below ground storage can be lined and used for attenuation.

Figure 10 An example of permeable paving.

4.8.2 I CAN'T FIT SUDS WITHIN MY DEVELOPMENT

SuDS should be considered in all developments at an early stage. This allows for allocation of appropriate land take to accommodate adequate SuDS features that are technically appropriate for the environment in which they are to be placed.

High density developments are prime candidates for permeable paving, green roofs, rainwater harvesting and swales. The importance of multi-functional spaces becomes more prevalent in high density developments as allocated open space (if considered early) can integrate SuDS elements.

4.8.3 CLAYEY SOILS PREVENT ME FROM UTILISING SUDS

Ground conditions do not prevent the use of SuDS, only the choice of the elements to use in the system.

Although infiltration SuDS are not suitable in clayey soils, the likes of swales, ponds and wetlands can still be implemented, with water stored at a high level, as can permeable paving directed to alternative storage. Even moderate or small levels of infiltration can provide a benefit so could be considered alongside other methods of discharge.

4.8.4 GROUNDWATER CONTAMINATION IS AN ISSUE FOR MY SITE

Ground conditions do not prevent the use of SuDS, only the choice of the system.

If the site is at risk of groundwater or soil contamination the system should be lined with an impermeable geomembrane liner. This impermeable geomembrane liner may be removed, following receipt of evidence that demonstrates that the contaminants are not mobilised with surface water (leachability testing).

4.8.5 SHALLOW GROUNDWATER LEVELS PREVENT ME FROM UTILISING SUDS

SuDS should be selected and designed to be on the surface, or shallow in depth, to accommodate shallow groundwater.

Use of impermeable geotextile liners (such as a waterproof membrane or compacted native clay) can be used to minimise infiltration from the surrounding groundwater.

In these instances, infiltration may be unsuitable. However, SuDS for attenuation or treatment purposes may still be integrated into the development. We recommend following SuDs Manual (C753) as this offers appropriate advice on infiltration-based devices and information required for approval.

4.8.6 CAN SUDS BE LOCATED IN PRIVATE AREAS?

Yes. Some methods are appropriate (e.g., permeable driveways or individual soakaways), but responsibility for management of the systems must be identified. Responsibility for SuDS serving more than one property should rest with a management company or adopting authority rather than individual house owners. Therefore, SuDS techniques that serve more than one property should not be located in private gardens.

4.8.7 MY SITE IS TOO FLAT TO INCORPORATE SUDS

Whilst it is challenging to manage surface water runoff on flat sites, the best option is to keep surface water runoff on the surface as much as possible and to manage runoff close to its source. Water can be conveyed on the surface using roadside kerbs and shallow rills and swales, and a designer should explore all alternative means of conveyance before pumping.

4.8.8 MY SITE IS TOO STEEP TO INCORPORATE SUDS

Steep slopes increase runoff velocity creating a challenge for SuDS. However, check dams and storage features can be used to slow runoff rates and accommodate infiltration and/or attenuation.

5 LOCAL STANDARDS AND GUIDANCE FOR SURFACE WATER DRAINAGE DESIGN, CONSTRUCTION, OPERATION AND MAINTENANCE IN OXFORDSHIRE

This section sets out the standards that will be applied by the LLFA for new development proposals in Oxfordshire. Defra's Non-statutory technical standards for sustainable drainage systems (March 2015) are provided below (indicated by S), followed by specific requirements that the LLFA will be using to assess the drainage implications of Major planning applications in Oxfordshire (indicated by L), and guidance for other factors that should be taken into consideration, but which the LLFA will not provide specific comment on.

FLOOD RISK OUTSIDE THE DEVELOPMENT

NATIONAL STANDARDS

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 below) and volume control technical standards (S4 and S6 below) need not apply.

LOCAL STANDARDS

It should be noted that there are no such surface water bodies within Oxfordshire and therefore standards S2, S3, S4 and S6 will always apply**.**

PEAK FLOW CONTROL NATIONAL STANDARDS

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 must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event.

LOCAL STANDARDS

L1 The greenfield runoff rate will need to be agreed with the LLFA, Environment Agency (EA), relevant sewerage undertaker and Canal and River Trust (CRT), where appropriate, and should take into account the 1 in 1 year, 1 in 30 year and 1 in 100 year rainfall events, including climate change allowances.

L2 Evidence would need to be provided to support a higher rate of discharge than greenfield rates, and would have to be agreed by the relevant authorities as in L1.

L3 For brownfield or previously developed sites, where it is proposed to discharge runoff at rates greater than greenfield rates, evidence will be required to demonstrate why it is not feasible to achieve greenfield rates. The capacity of any existing drainage system within the site should also be assessed in order to determine the current discharge rates.

L4 All flow control devices restricting the rate of flow should have a bypass feature to manage flows when a blockage occurs. The bypass can be an internal weir overflow within the chamber discharging to the outfall pipe or channel. An overflow shall be provided from any basin/pond etc. safely routing flows to the discharge location.

L5 For all residential developments, the proposed impermeable area for the site used in all calculations should include an additional allowance of 10% to account for the potential of Urban Creep.

Additional Local Guidance

Detailed guidance on the application of the Environment Agency's climate change allowances are set out in **Appendix G**.

Brownfield sites are strongly encouraged to discharge at the greenfield rate wherever possible. Where proven that greenfield rates cannot be achieved the best discharge rate needs to be quantified. As a minimum, brownfield sites should reduce the discharge by 40% to account for the impacts of climate change, from the existing site runoff OR from the original un-surcharged pipe-full capacity of the existing system, whichever is the lowest. The Local Planning Authority may have local standards and we recommend that advice is sought from the LPA for guidance.

It is understood that some guidance recommends minimum discharge rates of 5 l/s, to minimise use of small orifice openings that could be at risk of blockages. However, appropriate consideration of filtration features to remove suspended matter and suitable maintenance regimes should minimise this risk and therefore the minimum limit of 5l/s does not apply in Oxfordshire.

The Urban Creep allowance has been set as per CIRIA C753 (version 6) paragraph 24.7.2. Urban Creep is "The conversion of permeable surfaces to impermeable over time, e.g. surfacing of front gardens to provide additional parking spaces, extensions to existing buildings, creation of large patio areas." The effect of Urban Creep over the lifetime of a development can increase impermeable areas by as much as 10%.

VOLUME CONTROL

NATIONAL STANDARDS

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 site.

LOCAL STANDARDS

Additional Local Guidance

Uncontrolled discharge volumes on developed sites can be up to 10 times greater than the pre-development/greenfield equivalent. This additional volume may cause a risk of flooding to the receiving water body. The difference between existing and proposed volumes of water should not be discharged off site i.e. should be infiltrated wherever possible. Where ground conditions do not allow infiltration, the additional volume must be stored on site to be slowly released – this volume is referred to as the Long-Term Storage Volume.

There are two options for providing storage in order to limit peak discharge rates and volumes from the developed site. Either:

- Simple: Limit discharge rates for rainfall events up to and including the 1 in 100 year event (including climate change allowances) to the agreed QBAR rate (or 2l/s/ha whichever is greater) and 1 in 1 year event to the corresponding green field event; or

- Complex: For the greenfield volume, provide variable discharge rates to meet the equivalent greenfield 1 in 1, 1 in 30, and 1 in 100 rates, and either infiltrate or provide Long Term Storage for the additional volume of runoff produced by the development (The difference in runoff volume pre- and post-development for the 100 year 6 hour event), to discharge at rates below 2l/s/ha.

Evidence would need to be provided to support a higher volume of discharge and would have to be agreed by the LLFA, relevant sewerage undertaker, Environment Agency, or Canal and River Trust (where appropriate).

FLOOD RISK WITHIN THE DEVELOPMENT

NATIONAL STANDARDS

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.

LOCAL STANDARDS

L6 Flow across the site must be diverted away from buildings and main access-egress routes. This flooding should be assessed to ascertain if is safe for the sites users. All drainage schemes must demonstrate that flooding will not occur to any habitable building for the worst case 1:100yr +40% climate change event. The depth and rate of flow of the flood water should be compared to Table 4 of "Supplementary Note on Flood Hazard Ratings and Thresholds for Development Planning and Control Purposes" May 2008.

L7 The drainage system must be designed to accommodate overland flow from adjacent land if this is likely to be intercepted or affected by the development. All development must clearly identify that surface water from adjacent land has been considered appropriately and mitigation measures employed to prevent flood risk.

L8 Any infiltration storage features should be capable of half emptying within 24 hours of the rainfall event. This is to ensure capacity for further rainfall events.

L9 It should be demonstrated that high water access for maintenance of all elements is possible.

The design of the scheme should ensure that the levels at the outfall for the design storm event would not affect the performance of the system. If the outfall of an attenuation facility is likely to be submerged in the design 1 in 100 year rainfall event, then this should be assessed within any hydraulic modelling.

L10 All surface storage features should provide a minimum 300mm residual uncertainty allowance (freeboard) above the design maximum water level to top of bank and to finished floor levels around the site.

L11 The risk of high groundwater levels must be accounted for in the design of infiltration drainage. The invert of any infiltration device should be at least 1.0m above the maximum groundwater level recorded.

Additional Local Guidance

It should be demonstrated that any blockage within the system and extreme rainfall volumes can be accommodated through safe overflow routes.

The Environment Agency published new guidance on calculating appropriate freeboards – now termed 'residual uncertainty allowance' – which can be found at https://www.gov.uk/government/publications/accounting-for-residual-uncertainty-an-update-to-the-fluvial-freeboard-guide. This guidance should be followed to calculate the appropriate allowance, with 300mm being suitable as the minimum requirement.

The position of walls, bunds or other obstructions may direct but must not impede flow routes or create ponding.

Green areas, roads and non-highway footpaths/cycleways often provide suitable conveyance corridors. The cross-falls and kerb heights may be adjusted above normal standards to ensure the water is effectively managed – such departures must be agreed with the Highway Authority.

STRUCTURAL INTEGRITY

NATIONAL STANDARDS

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.

Local Standards

Additional Local Guidance

For 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.

Designing for Maintenance Considerations

National Standards

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.

Local Standards

L12 The minimum acceptable pipe diameter is 50mm where the risk of blockage is low (i.e. if flow has already been treated through filtration), or 150mm before such treatment (where risk of blockage is high). The design of controls with smaller diameter may be agreed at the discretion of the LLFA.

L13 Prior to discharge into any underground infiltration system, measures should be provided to remove silt, suspended or floating matter.

L14 Soakaways should be a chamber or geocellular type with access provided for removing silt and a robust inspection and a satisfactory de-silting maintenance system put in place. Rubble filled soakaways are not acceptable unless adequate easily inspected and maintained silt removal devices precede discharge to the soakaway.

L15 The designs of all elements of the surface water drainage system must be accompanied by a maintenance schedule that sets out how and when each element of the system should be inspected and maintained, who is responsible for the maintenance, and when each element may need replacement. The layout of the development must demonstrate that access to each element of the system can be achieved.

Additional Local Guidance

Maintenance regimes for all SuDS must be fully funded by the developer, except for those that are being adopted by a statutory body. This could be through a Section 106 agreement/separate agreement with the City, district, town or parish council with Commuted Sums paid for maintenance; through a service management company; or by private individuals (only where the SuDS serve individual properties).

If the SuDS are not being adopted by a statutory body, maintenance proposals shall be proactive not reactive – blockages should not be allowed to occur with resultant surface flooding or to the detriment to the performance of the SuDS. SuDS features shall be designed and located to facilitate the maintenance regime specified in the guidance documents. Other maintenance regimes may be agreed with the LLFA to mitigate flood risk or with the EA regarding water quality and biodiversity etc.

Suitably surfaced access tracks should be provided for accesses to, in and around the SuDS for vehicles, machinery and heavy plant to undertake inspection and physical maintenance, where required.

Controls and de-silting features should be easily accessible from the surface. Small controls (orifice plates, slots, etc) shall be visible from the surface without the need for removal of covers or use of special access facilities (e.g. visible through gratings or grids). Thus any blockage can be readily identified during a walk-by inspection.

Silt traps should be readily accessible for manual clearance or suction vehicles. Vortex separators should not require man-entry for inspection or emptying.

Construction

National Standards

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.

Local Standards

L16 The drainage system must be operational before construction of any impermeable surfacing, to mitigate the risk of flooding during construction. For large phased developments, any strategic drainage elements that serve more than one parcel or phase must be designed and constructed to be fully functional prior to construction of each parcel.

Additional Local Guidance

For SuDS elements sensitive to siltation, the form of the drainage should be constructed during the earthworks phase, but the final construction should not take place until the end of the development programme, unless adequate provision is made to remove any silt that is deposited during construction operations, and refurbish any areas that have been subject to over-compaction, siltation etc. Establishment of landscaping vegetation and sediment removal should take place once site works have been completed and prior to commencement of the maintenance period.

Surface water runoff from the construction site should not drain into SuDS components unless it has been allowed for in the design and specification. This will avoid silt-laden runoff from clogging infiltration systems or building up in storage systems.

Provision should be made in the construction contract to review the performance of the SuDS when it is completed, and to allow for minor adjustments and refinements to be made to optimise the physical arrangements, based on observed performance.

Runoff Destinations

Local Standards

L17 The submitted documents shall identify sources of water entering the site predevelopment, how flows will be routed through the site, where flows leave the site pre development and where they will leave post development. This should include details of flows from all catchments and sub-catchments discharging into, through and from the site. Any changes to the locations of these sources and points of discharge must be agreed with adjacent landowners or responsible authorities and written agreement from these parties must be provided at the time of application.

L18 Surface runoff not collected for use should be discharged to one or more of the following, listed in order of priority:

- Discharge into the ground (infiltration); or, where not reasonably practicable,
- Discharge to a surface water body or watercourse; or, where not reasonably practicable,
- Discharge to a surface water sewer, highway drain, or another drainage system; or, where not reasonably practicable,
- Discharge to a combined sewer.

When discharging to an existing sewer or drain, evidence will be required to demonstrate that the owner of the sewer or drain (sewerage undertaker for sewers, highways authority for highway drains, or private owner) has accepted the point and rate of discharge, and that there is capacity to accommodate these flows. The owner may request improvements to the sewer or drain, or for discharge rates to be reduced below the Greenfield rate or other rate agreed by the LLFA. Oxfordshire County Council will not accept non highway water into a highway drain.

Additional Local Guidance

Dealing with the water locally in sub-catchments not only reduces the quantity that has to be managed at any one point, but also reduces the need for conveying the water off the site. When dividing catchments into small sections it is important to retain a perspective on how this affects the management of the whole catchment and the hydrological cycle.

Water Quality

Local Standards

L19 At least one surface feature should be deployed within the drainage system for water quality purposes, or more features for runoff which may contain higher levels of pollutants in accordance with the CIRIA SuDS Manual C753. Only if surface features are demonstrated as not viable, then approved proprietary engineered pollution control features such

as vortex separators, serviceable/ replaceable filter screens, or pollution interceptors may be used.

L20 To ensure protection of groundwater quality, there should be at least 1.0m between the maximum recorded groundwater level and the base of the infiltration system. The Environment Agency may have additional requirements.

L21 Soakaways and other infiltration SuDS must not be constructed in contaminated ground.

Additional Local Guidance

If the surface of an infiltration system is too close to the water table, a rise in water levels during particularly wet periods could cause groundwater to enter the infiltration system, reducing the amount of storage available. Groundwater entering the infiltration system would also result in direct discharge from that infiltration system into groundwater, which may contravene permitting requirements and environmental legislation.

The use of infiltration drainage would only be acceptable if a site investigation showed the absence of any significant contamination or if the design mitigates any risk posed to groundwater. Please refer to 'Groundwater protection: Principles and practice (GP3)' Position Statements G9 Use of deep infiltration systems for surface water and effluent disposal to G13 Sustainable Drainage Systems.

Green and brown roofs, rainwater harvesting, and infiltration SuDS features are all accepted to provide interception of the first 5mm of rainfall from the impermeable area served. Other SuDS features may provide some interception through evapotranspiration and infiltration, but the amount will depend on the size and characteristics of the feature in comparison to the area being served – see Section 24.8 of the CIRIA SuDS Manual for more information.

MULTI-FUNCTIONALITY

LOCAL STANDARDS

L22 Where site use allows, SuDS should be designed as part of multi-functional spaces such as sports and recreational areas, with opportunities for education. The expected design frequency of inundation areas and attenuation function should be determined in order to facilitate and manage multi-function use.

L23 In multi-functional spaces, where dry detention or infiltration basins are proposed, a lower area should be provided to restrict the wet areas during more frequent events and thus maximise the duration and extent of areas available for leisure purposes elsewhere within the feature.

Additional Local Guidance

Where access for the mobility impaired is to be provided at detention and infiltration basins, this should be included in accordance with BS 8300 Section 5.

Any footpaths, mobility paths, and street furniture must be located so as not to obstruct access for maintenance.

DESIGNING FOR ECONOMIC SUSTAINABILITY

LOCAL STANDARDS

Additional Local Guidance

SuDS should be designed to provide an effective 'whole life' sustainable solution, by ensuring that:

- Systems operate efficiently for long periods (20 to 50 years) before replacement or rehabilitation is needed;
- Systems operate efficiently for medium periods (2 to 5 years) before significant maintenance activities are required;
- Regular operation and maintenance needs are easily understood and implemented by relatively unskilled labour; and
- Where possible, natural resources are reused and energy efficient products, processes, operation and maintenance are possible.

SuDS in School Sites

Additional Local Guidance

LLFA Expectations for SuDS use on School Sites:

The LLFA consider that new school sites delivered as part of a strategic development can be designed to avoid onsite storm water drainage. The LLFA will not support attenuation/ tank storage due to long term maintenance and sustainability issues.

Further, the LLFA recognise that the on-surface stormwater storage on new school sites can present significant health and safety risks; management problems and significantly reduce usable site area.

Therefore, on surface attenuation provision that allows for the outfalls from school sites shall be provided externally to any school site. The stormwater outfall from any school site shall include up to 0.5FE expansion over and above the proposed size of any school site.

This "on the surface" water storage shall form part of the overall surface water management infrastructure and shall fall under the responsibility of the appointed Management and Maintenance Company to maintain in perpetuity.

This will increase sustainability and maximise environmental gain through water resources, biodiversity, landscape, educational functionality and amenity, as well as reduce overall capital and maintenance liability.

Highways SuDS

Additional Local Guidance

Adequate land needs to be safeguarded for Highway infrastructure including SuDS measures

Land needs to be safeguarded through reserved matters for adequate SuDS source control measures to serve the highway.

The SuDS philosophy and concepts within the Oxfordshire guidance are based upon and derived from the CIRIA SuDS Manual (C753), and we expect all development to come forward in line with these principles.

In line with this guidance, we will expect developments to move away from traditional below ground piped drainage systems to more efficient, resilient and flexible sustainable drainage systems.

Wherever possible, runoff must be managed at source (i.e. close to where it falls) with residual flows then conveyed downstream to further storage or treatment components, where required.

Underground piped systems are prone to blockage, posing a risk of flooding, as well as directing pollutants, such as oil, organic matter and toxic metals, straight to the natural environment without the opportunity to trap, breakdown or remove them.

Keeping water at ground within SuDS means any problems with the system can be identified quicker and easier than with a conventional system and are generally cheaper and more straightforward to rectify.

Pipe and gully systems provide significant maintenance burdens on the Highway Authority especially on major roads and must be designed out wherever possible through the planning process. Measures such as over the edge drainage to swales/filter drains must be considered from the beginning and adequate land provided within the highway corridor.

LANDSCAPE AND VISUAL IMPACT

LOCAL STANDARDS

The LLFA will not comment on nature, landscape, visual impact, and historical aspects, unless they appear to impact on the performance of the SuDS.

This responsibility remains with the LPA and any other statutory consultees as appropriate. Applicants shall consult the relevant stakeholders at the master planning stage and take into consideration any features or requirements they identify.

Additional Local Guidance

Water should be kept above the ground surface wherever possible, and SuDS should be considered as an integral part of the landscape or urban design.

SuDS features should be visually attractive, with features such as ponds and wetlands, and details such as channels, canals and cascades to provide visual interest.

Natural drainage features around the site should be retained and enhanced.

Where possible, all hard structures such as inlets, outlets and headwalls should be designed to be unobtrusive. Appropriate cladding such as local stone should be considered.

The shape and depth of swales or basins below surrounding ground should be integrated into the landscape but not be excessive in land take.

ECOLOGY

LOCAL STANDARDS

The LLFA will not comment on nature, landscape, visual impact, and historical aspects, unless they appear to impact on the performance of the SuDS. This responsibility remains with the LPA and any other statutory consultees as appropriate. Applicants shall consult the relevant stakeholders at the master planning stage and take into consideration any features or requirements they identify.

Additional Local Guidance

The primary function of SuDS is flood prevention; consequently, the maintenance regime should not be restricted by ecological requirements to the detriment of flood prevention. The design of the shape or depth of waterbodies should recognise and accommodate the ecological habitats and species that they may develop and be supported over time. The SuDS should have a maintenance regime which takes these habitats and species into account. Specialist input from an ecologist may in waterbody design and maintenance regimes may be appropriate. Grass strimming, grass cutting and silt removal, dredging etc shall be carried out on a frequent basis to maintain the designed flow regime.

Where a developer does want to create a habitat for a protected species, the system needs to be oversized and on a larger footprint to enable maintenance to take place whilst maintaining the appropriate level of service.

A robust vegetation cover should be established as soon as possible to prevent silt migration and assist the drainage function. This will then develop into a biodiversity asset.

Local indigenous plant material applicable to Oxfordshire should be used where possible to allow natural colonisation of SuDS features. The planting of non-indigenous or any invasive or vigorously colonising species is not appropriate. All planting in open SuDS should be native to the UK, ideally of local provenance, and from an accredited source to avoid the introduction of alien species.

A shallow aquatic edge to ponds and wetlands should be included, with a maximum depth of 450mm and minimum width of 1m, for safety reasons.

To discourage excessive vegetation within the main body of water, the bed should be at least 1m below normal water level and thus limit light levels on the bed.

APPENDIX A: SUDS STANDARDS, GUIDANCE AND USEFUL DOCUMENTS

Further information on SUDS can also be found at:

- https://www.oxfordshirefloodtoolkit.com/planning/surface-water-drainage/
- www.susdrain.org
- CIRIA – provide a range of advice and publications on SUDS, including the SUDS Manual. www.ciria.org.uk/suds
  - CIRIA Designing for Exceedance. C635.
  - CIRIA Rainwater and grey-water reuse in buildings: best practice guidance. C539.
  - CIRIA Source control using constructed pervious surfaces. C582.
  - CIRIA Designing for exceedance in urban drainage – good practice. C635.
  - CIRIA Building greener. Guidance on the use of green roofs, green walls and complementary features on buildings. C644.
  - CIRIA Structural design of modular geocellular drainage tanks. C680.
  - CIRIA Site handbook for constructing SUDS. C698.
  - CIRIA The updated SUDS Manual. C753.
- The Building Regulations part H, Drainage and Waste Disposal. www.planningportal.co.uk/info/200135/approved_documents/71/part_h_-_drainage_and_waste_disposal
- British Standard BS 7533-13: 2009. Pavements constructed with clay, natural stone or concrete pavers – Part 13: Guide for the design of permeable pavements constructed with concrete paving blocks and flags, natural stone slabs and setts and clay pavers.
- Interim Code of Practice for SUDS - provides advice on design, adoption and maintenance issues and a full overview of other technical guidance on SUDS http://www.susdrain.org/files/resources/other-guidance/nswg_icop_for_suds_0704.pdf.
- Waterscapes: Planning, Building and designing with Water. Edited by Herbert Dreiseitl, Dieter Grau and Karl H. C. Ludwig: Birkhauser.
- Interpave - Guide to the Design, Construction and Maintenance of Concrete Block Permeable Pavements.
- Interpave - Understanding Permeable Paving.
- Environment Agency Green roof tool kit.
- Kellagher RBB and Lauchlin CS Use of SUDS in high density developments, defining hydraulic performance criteria. HR Wallingford Report SR 640.
- Kellagher RBB and Lauchlin CS Use of SUDS in high density developments, guidance manual. HR Wallingford Report SR 666.
- BRE 365 (2016) Soakaway design guide www.brebookshop.com.
- Groundwater Protection : Principles and Practice (GP3)
- BeST (Benefits of SuDS Tool) for evaluating the multiple benefits of SuDS http://www.susdrain.org/resources/best.html

APPENDIX B: DRAINAGE LEGISLATION AND GUIDANCE

Sustainable surface water management is increasingly recognised as an important consideration in national, regional and local planning as an effective means to assist in the management of flooding. A number of these policy documents must be adhered to when designing SuDS. The main documents are summarised below.

NATIONAL GUIDANCE

The Flood and Water Management Act (2010) (FWMA) (the Act)

Schedule 3 of the Act provides for Lead Local Flood Authorities to approve, adopt and manage SuDS. However, this part of the Act has not been enacted.

The Act can be viewed at http://www.legislation.gov.uk/ukpga/2010/29/contents.

The National Planning Policy Framework (2018) (NPPF)

The NPPF for England promotes the integration of SuDS features within development proposals to control surface water, improve water quality and increase biodiversity.

The new measures must be applied by local planning authorities (LPAs) through local policies and plans, as well as planning application decisions on 'major developments' of 10 or more dwellings and equivalent non-residential or mixed developments. However, this situation might change as the Government intends to "keep this under review, and consider the need to make adjustments where necessary".

The NPPF can be viewed at https://www.gov.uk/government/publications/national-planning-policy-framework--2.

The DCLG ministerial statement can be viewed at http://www.parliament.uk/business/publications/written-questions-answers-statements/written-statement/Commons/2014-12-18/HCWS161/.

The Non-Statutory National Technical Standards for Sustainable Drainage (The National Standards)

The non-statutory National Standards (April 2015) cover the generic requirements for design of SuDS. They provide requirements for: flood risk outside the development; peak flow control; volume control; flood risk within the development; structural integrity; designing for maintenance considerations; and construction.

In terms of the overall viability of a proposed development, expecting compliance with the technical standards is unlikely to be reasonably practicable if more expensive than complying with building regulations - provided that where there is a risk of flooding the development will be safe and flood risk is not increased elsewhere. Similarly, a particular discharge route would not normally be reasonably practicable when an alternative would cost less to design and construct.

The National Standards can be viewed at www.gov.uk/government/publications/sustainable-drainage-systems-non-statutory-technical-standards.

The Buildings Regulations – Part H (December 2010)

Part H of the Buildings Regulations: Drainage and Waste Disposal, establishes a hierarchy for surface water disposal, which encourages a SuDS approach. This hierarchy is that surface runoff must be discharged to one or more of the following in order of priority:

- An adequate soakaway or some other adequate infiltration system; or, where not reasonably practicable,
- A watercourse; or, where not reasonably practicable,
- A sewer.

The regulations can be viewed at www.planningportal.gov.uk/buildingregulations/approveddocuments/parth.

LOCAL GUIDANCE

Oxfordshire Local Flood Risk Management Strategy (LFRMS)

The LFRMS focuses on local flood risk resulting from surface water, groundwater and ordinary watercourses flooding. The LFRMS sets out the management of flood risk in Oxfordshire for the coming years.

The LFRMS can be viewed on the Flood Toolkit at https://www.oxfordshirefloodtoolkit.com/wp-content/uploads/2016/04/OxfordshireFloodRiskManagementStrategy.pdf

Flood Risk Management Plans (FRMPs)

FRMPs highlight the hazards and risks of flooding from rivers, the sea

surface water, groundwater and reservoirs, within the river basin district, and set out how Risk Management Authorities work together with communities to manage flood risk. Oxfordshire is covered by Thames River Basin District FRMP.

There is one agreed measure relating to drainage and development which appears in the majority of sub-catchments, namely: "*seek the inclusion of policies in planning documents for development in areas at risk of flooding to be resilient and for the implementation of Sustainable Drainage Systems (SuDS)*"

Further information on these plans can be viewed at https://www.gov.uk/government/collections/flood-risk-management-plans-frmps.

Water Cycle Studies (WCSs)

These studies aim to identify the water related infrastructure improvements required to support proposed strategic development sites within the Core Strategies. In Oxfordshire, there are two WCSs: the West Oxfordshire WCS and the South Oxfordshire WCS.

Each of the WCSs can be viewed at:

- West Oxfordshire WCS - http://www.westoxon.gov.uk/media/1572197/ENV11-West-Oxfordshire-Water-Cycle-Study-Phase-1-Scoping-Study-November-2016-.pdf
- South Oxfordshire WCS – http://www.southoxon.gov.uk/sites/default/files/Water%20Cycle%20Study%20Phase%20I%20-%20S%20Oxfordshire%20District%20Council.pdf

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Strategic Flood Risk Assessments (SFRAs)

These assessments evaluate the strategic risk to areas, focusing on fluvial flood risk.

Each of the SFRAs can be viewed at:

- Cherwell District Council https://www.cherwell.gov.uk/downloads/download/367/cherwell-level-2-strategic-flood-risk-assessment-may-2017
- Oxford City- https://www.oxford.gov.uk/downloads/download/435/strategic_flood_risk_assessment
- South Oxfordshire District Council and Vale of White Horse District Council http://www.southoxon.gov.uk/sites/default/files/2013s6892%20VOWH&SODC%20SFRA%20Final%20Report.pdf -
- West Oxfordshire District Council http://www.westoxon.gov.uk/media/1572191/ENV9-West-Oxfordshire-District-Council-Strategic-Flood-Risk-Assessment-Update-Report-November-2016-.pdf

Surface Water Management Plans (SWMPs)

These plans assess the risk of flooding from surface water sources and the interaction with fluvial (main river) sources.

South Oxfordshire Core Strategy (2012)

This core strategy sets out our vision for South Oxfordshire to 2027

http://www.southoxon.gov.uk/sites/default/files/2013-05-01%20Core%20Strategy%20for%20Website%20final_0.pdf

Section 14.13 of the Core Strategy states:

'The NPPF requires that we follow a sequential test when identifying land for development, looking at zone 1 land first. This is land least likely to flood. The Strategic Housing Land Availability Assessment135 shows that there is enough zone 1 land available in the district to meet our future greenfield allocation needs in our towns and villages. We will not therefore need to look at zone 2 or 3 land for the built element of greenfield allocations or carry out any exception testing. For other development we will follow the NPPF and its technical guidance and extant guidance in PPS25: Development and Flood Risk Practice Guide.'

Oxford City Council Core Strategy

The Core Strategy is part of Oxford's Local Plan. It contains a vision for Oxford and contains policies against which all planning applications area judged. The Core Strategy was adopted by the City Council on 14 March 2011.

Policy CS2 of the Oxford City Core Strategy states, 'Greenfield land will not be allocated for development if any part of the development would be on Flood Zone 3b, or if it would cause harm to a site designated for its ecological value'.

Policy CS11states 'Planning permission will not be granted for any development in the functional flood plain (Flood Zone 3b) except water-compatible uses

and essential infrastructure. The suitability of developments proposed in other flood zones will be assessed according to the PPS25 sequential

approach and exceptions test. For all developments over 1 hectare and/or development in any area of flood risk from rivers (Flood Zone 2 or above) or other sources* developers must carry out a full Flood Risk Assessment (FRA), which includes information to show how the proposed development will not increase flood risk. Necessary mitigation measures must be implemented. Unless it is shown not to be feasible, all developments will be expected to incorporate sustainable drainage systems or techniques to limit runoff from new development, and preferably reduce the existing rate of run-off. Development will not be permitted that will lead to increased flood risk elsewhere, or where the occupants will not be safe from flooding.

*Note: "Other sources" of flood risk include those arising from groundwater, sewerage overflow and surface run-off.

Further details can be found at https://www.oxford.gov.uk/corestrategy .

River Basin Management Plans (RBMPs)

Each RBMP describes the current situation and the consequences for the water environment, along with the actions that will be taken to address the pressures. Oxfordshire is covered by four River Basins, namely: Thames, Cherwell, Severn and Anglian.

The RBMP for each of these areas can be accessed at https://www.gov.uk/government/collections/river-basin-management-plans-2015.

Links to Green and Blue Infrastructure

The National Planning Policy Framework defines green infrastructure (GI) as 'a network of multi-functional green space, urban and rural, which is capable of delivering a wide range of environmental and quality of life benefits for local communities.' Blue infrastructure (BI) refers to all water bodies, including the river network.

SuDS features can provide GI and BI and the associated benefits, helping ensure that a multi-functional GI and BI network is achieved in the County in the long-term. Principles for incorporating Green and Blue Infrastructure with SuDS include:

- The delivery of multi-functional green infrastructure such as flood management areas used for amenity purposes is fundamental, and proposals should be formulated to secure this wherever possible;
- The delivery of a connected network is important to ensure strategic objectives are achieved with regard to multi-functionality such as managed overland flood routes for extreme events and wildlife corridors;
- Preference should be given to GI proposals which complement other GI assets and resources in the locality;
- The principle of 'net gain' should be secured using other means where there is to be a loss in a GI resource as a result of implementing a SuDS scheme;
- Ensuring the quality of the GI resource is retained or delivered in the long-term is essential;
- Opportunities to consider socio-economic as well as environmental gains should be sought during the delivery of GI at all times; and
- Opportunities for GI delivery should be taken as and when they arise; both flagship and small scale projects will therefore be important in delivering change in the long term.

Local Planning Authorities may have area specific GI strategies that can be consulted for further information.

APPENDIX C: INFORMATION REQUIRED FOR OUTLINE PLANNING APPLICATIONS

The following information should be provided for every drainage strategy submitted to the LLFA for consideration as part of an **Outline Planning Application**.

Detail required for Outline Applications	Provided?
Non-Technical Summary Non-technical summary of the proposed drainage strategy.	
Description of the type of development Description of the type of development proposed and where it will be located. Include whether it is new development, an extension to existing development or change of use etc. State the area of the development site itself, how much of the site is currently hard standing, the proposed area to be hard standing post-development, and any proposed areas of public open space. Note that in calculations proposed values of impermeable area should include a 10% allowance for Urban Creep, as taken from CIRIA C753 (version 6) paragraph 24.7.2.	
A location plan Location plan at an appropriate scale should be provided with the application, showing site outline and other adjacent land under the applicant's control.	
Plans Plans showing the existing site layout, its topography, any water features, and how the site currently drains. Plans should also be provided of the proposed layout if available and demonstration that the proposed drainage system and other mitigation measures are achievable and that adequate space has been made for water.	
Assessment of all flooding risks to the site This should include groundwater, overland surface water flows, sewer flooding, infrastructure flooding (from reservoirs/ponds/canals), watercourse flooding and the risk posed by the proposed development.	
Explanation of how each of these flood risks will be mitigated This may require modelling of some sources where significant flood risk is shown on high level datasets. It might mean applying the sequential approach to the site by avoiding building on one part of the site where there is known flooding.	
Explanation of how the drainage discharge hierarchy has been followed, providing evidence why any are inappropriate: • Firstly, to infiltration/soakaway • Secondly, to a watercourse or highway ditch (with permission) • Thirdly, to a surface water sewer or highway drain (with permission) • Lastly, to a combined sewer (with permission)	
Evidence that the site has an agreed point of discharge - If a significant portion of surface water is to be infiltrated on site, provide a BRE365 infiltration assessment to prove that this will work effectively. At outline stage it may be acceptable to base infiltration values on typical values for the local geology, as long as an alternative drainage design and agreed point of discharge is provided should infiltration	

Detail required for Outline Applications	Provided?
rates prove to be unsuitable. - If discharge is to an ordinary watercourse, evidence will need to be provided to ensure that the system can accept the proposed flows to an acceptable downstream point without increasing risk to others. If the watercourse is not within the boundary of the site, evidence will be required that the developer has a right to cross 3rd party land. - If discharge is to a surface water or combined sewer, or highways ditch or drain, letter of confirmation from the Water Company or responsible body will be required, stating their required discharge maximum rates and confirmation that there is adequate capacity in the existing system. This information is generally provided by going through the relevant water company's "Pre-Planning Service". This is a formal process that all developers are expected to go through to inform their planning applications. There is normally an associated cost for this service and a minimum timescale of 15 working days to obtain a response. The advice is then usually valid for a one year period. This process will provide assurance that there are no capacity issues with third party assets, as we as the LLFA are not able to make this type of assumption on behalf of a Water and Sewerage provider. - Thames Water: https://my.thameswater.co.uk/dynamic/cps/rde/xchg/corp/hs.xsl/18710.htm - Anglian Water: http://www.anglianwater.co.uk/developers/pre-planning-service-.aspx - Severn Trent Water: https://www.stwater.co.uk/developers/application-forms-and-guidance-notes/ (> application forms > Development enquiry application form)	
Calculations of current runoff from site • For greenfield sites, existing greenfield runoff rates and volumes can be produced through the UK SuDS website http://www.ukSuDS.com/, or by using the Institute of Hydrology IoH124 method. • If brownfield sites, clearly state the existing impermeable area and calculate the rates of runoff from the site. If a piped drainage system already exists within the site, the existing capacity of these pipes will need to be estimated.	
Calculations of allowable runoff from site Clearly state the proposed impermeable areas for the site and how this compares to existing values. In all calculations, proposed values of impermeable area should include a 10% allowance for Urban Creep, as taken from CIRIA C753 (version 6) paragraph 24.7.2. The Modified Rational Method is considered acceptable only for initial design estimates (i.e. at Outline planning) or for very simple sites (i.e. Minor developments). • Greenfield sites should discharge at no greater than the current greenfield rate so that the site behaves like the original site across the range of events. • Brownfield sites are strongly encouraged to discharge at the greenfield rate wherever possible. As a minimum, brownfield sites should reduce the discharge by 40% to account for the impacts of climate change, from the existing site runoff OR from the original un-surcharged pipe-full capacity of the existing system, whichever is the lowest. • Developers have the option to limit discharge for all events to the QBAR flow rate; or install a complex discharge control which reflects the original discharge for run-off rates from the site across the range of storm events. E.g. QBAR, 3.3% (1in30), 1% (1in100), and provide Long Term Storage for all runoff volume greater than the greenfield volume (as set out in 'Calculation of Storage Volume' below). It is understood that some guidance recommends minimum discharge rates of 5 l/s, to minimise use of small orifice openings that could be at risk of blockages. However, appropriate	

Detail required for Outline Applications	Provided?
consideration of filtration features to remove suspended matter and suitable maintenance regimes should minimise this risk and therefore the minimum limit of 5l/s does not apply in Oxfordshire. • Due to the additional datasets that have been added to the Flood Estimation Handbook (FEH) since design rainfall events were developed originally in the Flood Studies Report (FSR) (NERC, 1975), rainfall depths obtained using FEH show significant differences from those obtained from FSR in some parts of the country. Within Oxfordshire, rainfall depths are often greater using more up to date FEH datasets than those using FSR, therefore for various storm events, greater run-off is produced, and additional attenuation is likely to be required. As FEH rainfall data is more up to date, calculations should use FEH data for surface water drainage design, except where the critical storm duration is less than 60 minutes, as it is recognised that FEH data is less robust for short duration storms. If FEH rainfall data is not used as described above, then sensitivity testing to assess the implications of FEH rainfall must be provided. This should demonstrate that the development proposals remain safe and do not increase flood risk to third parties.	
A calculation of storage volume Volume of storage required on site for the 1% (1in100) plus climate change storm, in order to meet the controlled discharge rate or available infiltration rate. Where appropriate this should specify the volumes of both attenuation storage and Long-Term storage. See also note above about use of FEH rainfall data. An estimation of storage (acceptable only for outline applications) can be produced through the UK SuDS website http://www.ukSuDS.com/, or using the WinDes Quick Storage Estimate tool.	
Plans showing a logical location of storage within the proposed development Attenuation storage within areas at risk of flooding will not be acceptable.	
Explanation of likely forms of SuDS for the site and reasons for the use of these features. If no SuDS methods are proposed, then justification and evidence will need to be provided as to why they are not appropriate for the site.	
Explanation of who will maintain the drainage system over the lifetime of the development and evidence that all elements of the drainage system will be fully accessible for maintenance without entering 3rd party land. Ideally, SuDS features should be located within public space.	
Phasing An explanation of how the site will adequately consider flood risk at all stages of the development.	

APPENDIX D: INFORMATION REQUIRED FOR FULL APPLICATIONS

The following information should be provided for every drainage strategy submitted to the LLFA for consideration as part of any **Full application**.

Detail required for Full Applications	Provided?
Non-technical summary Non-technical summary of the proposed drainage strategy.	
Description of the type of development Description of the type of development proposed and where it will be located. Include whether it is new development, an extension to existing development or change of use etc. State the area of the development site itself, how much of the site is currently hard standing, the proposed area to be hard standing post-development, and any proposed areas of public open space. Note that in calculations proposed values of impermeable area should include a 10% allowance for Urban Creep, as taken from CIRIA C753 (version 6) paragraph 24.7.2.	
Location plan Location plan at an appropriate scale should be provided with the application, showing site outline and other adjacent land under the applicant's control.	
Topography plan Topographical survey of the site, including cross-sections of any adjacent watercourses for appropriate distance upstream and downstream of discharge point if appropriate.	
Layout Plan Proposed layout of the development, clearly identifying areas of impermeable surfacing, public open space, natural features such as watercourses, and allocated areas for surface water storage.	
Ground Investigation which should account for: • The presence of constraints that must be considered prior to planning infiltration SuDS; • The drainage potential of the ground; • Potential for ground instability when water is infiltrated; and • Potential for deterioration in groundwater quality as a result of infiltration.	
Assessment of all existing flooding risks to the site An assessment should be made of the risk to the site from all sources of flooding: • **Surface water –** the Environment Agency's Surface Water flood map can be used to assess the level of surface water flood risk to the site. If this map is disputed or considered inaccurate, the developer would need to model the expected flows across the site and use the results to determine the level of risk to the site. • **Groundwater** – typically a geotechnical report is required to cover this. • **Canals** – normally a letter from the Canal and River Trust stating that there is no risk, otherwise modelling of potential overtopping or breach. • **Reservoirs** –the Environment Agency inundation maps can be used to determine local level of risk. If the mapped inundation extent is disputed, the Environment Agency may require further modelling by developer. • **Sewer –** typically a letter or model report from the Water Company. • **Fluvial (main river or ordinary watercourse)** - the Environment Agency have published flood mapping for watercourses with a catchment greater than 3km^2. They can be contacted to obtain models or data associated with this mapping. The Environment Agency will advise	

Detail required for Full Applications	Provided?
on whether flood risk associated with Main River has been assessed appropriately. If only approximate modelling is available for an ordinary watercourse and it is felt to be inaccurate or is disputed, the developer will be required to model such flooding accurately to ensure their development is safe. In some small catchments, the Environment Agency's Surface Water flood map may be considered as a suitable proxy where there is no fluvial floodplain mapping.	
Explanation of how each of these flood risks will be fully mitigated This could require detailed modelling of some sources where significant risk is shown on high level datasets. It might mean applying the sequential approach by avoiding building on one part of the site where there is known flooding. Examples of mitigation measures (note: this list in not exhaustive): • Setting minimum floor levels of the development; • Utilising the sequential approach by locating more sensitive development out of the floodplain that affects the site; • Works to improve/divert infrastructure to eliminate risk; • Proposals to route flood flows through a development so they do not adversely affect the development; • Avoiding the use of below-ground development or basements adjacent to areas of flood risk unless they are designed for flood storage; • Setting residential development 150mm above the adjacent ground level.	
Detailed Drainage Plans Showing the layout of the proposed drainage network, the location of storage within the proposed development and how these relate to submitted calculations, including any chamber, pipe numbers, direction of flow, invert and cover levels, gradients diameters and dimensions that are referenced in Micro Drainage (or similar) reports. The methods of flow control must be detailed, as should non-conventional elements such as ponds, swales, permeable paving etc.	
Full explanation of the forms of SuDS used on the site Including reasons for the use of these features, what flood mitigation, water quality, environmental and social benefits they might achieve. If no SuDS methods are proposed then justification and evidence will need to be provided as to why they are not appropriate for the site. Modelling of the proposed SuDS system for the site, showing the behaviour of the site for the main rainfall events described below ensuring: • Typical operation of the system for low rainfall and first-flush events, with indication of how treatment of surface water will be achieved. • No above ground flooding for any conventional element of the system for the 3.3% (1in30) event. • No flooding from the system to property or critical/sensitive infrastructure for the 1% (1in100) plus climate change event.	
Explanation of how the drainage discharge hierarchy has been followed, providing evidence why any are inappropriate: • Firstly, to infiltration/soakaway • Secondly, to a watercourse or highway ditch (with permission) • Thirdly, to a surface water sewer or highway drain (with permission) • Lastly, to a combined sewer (with permission)	
Evidence that the site has an agreed point of discharge • If a significant portion of surface water is to be infiltrated on site, provide a BRE365 infiltration assessment to prove that this will work effectively.	

Detail required for Full Applications	Provided?
• If discharge is to an ordinary watercourse, evidence will need to be provided to ensure that the system can accept the proposed flows to an acceptable downstream point without increasing risk to others. If the watercourse is not within the boundary of the site, evidence will be required that the developer has a right to cross 3rd party land. The drainage calculations will need to include an analysis of the effects on the drainage system if the outfall is likely to be surcharged during flooding events. • If discharge is to a surface water or combined sewer, or highways ditch or drain, letter of confirmation from the Water Company or responsible body will be required, stating their required discharge maximum rates and confirmation that there is adequate capacity in the existing system. This information is generally provided by going through the relevant water company's "Pre-Planning Service". This is a formal process that all developers are expected to go through to inform their planning applications. There is normally an associated cost for this service and a minimum timescale of 15 working days to obtain a response. The advice is then usually valid for a one year period. This process will provide assurance that there are no capacity issues with third party assets, as we as the LLFA are not able to make this type of assumption on behalf of a Water and Sewerage provider. • Thames Water: https://my.thameswater.co.uk/dynamic/cps/rde/xchg/corp/hs.xsl/18710.htm • Anglian Water: http://www.anglianwater.co.uk/developers/pre-planning-service-.aspx • Severn Trent Water: https://www.stwater.co.uk/developers/application-forms-and-guidance-notes/ (> application forms > Development enquiry application form)	
Calculations of current runoff from site Calculated runoff rates for the existing site for the following rainfall events: QBAR, 3.3% (1in30), 1% (1in100) and, 1% (1in100) plus climate change. A range of rainfall events should be assessed and the critical duration rainfall event selected for each case. For greenfield sites, the methodology in the EA/Defra document "Preliminary Rainfall Runoff Management for Development (W5- 074/A/TR1)" should be used as the basis for calculations. For brownfield sites, clearly state the existing impermeable area and determine the capacity of any existing drainage system.	
Calculations of proposed discharge from site All hydraulic calculations must be produced using approved software and should model the full drainage system. Provide a supporting explanation of methodology. Please note that it is not considered appropriate to use the Modified Rational Method for design calculations other than initial design estimates (i.e. at Outline planning) or for very simple sites (i.e. Minor developments). Clearly state the proposed impermeable area of the development and how this compares to the existing site. In all calculations, proposed values of impermeable area should include a 10% allowance for Urban Creep, as taken from CIRIA C753 (version 6) paragraph 24.7.2. Use the calculation of current runoff to decide discharge rates on the following basis: • Greenfield sites should discharge at a maximum of the equivalent rate so that the site behaves like the original greenfield across the range of events. • Brownfield sites are strongly encouraged to discharge at the greenfield rate wherever possible. As a minimum, brownfield sites should reduce the discharge by 40% to account for the impacts of climate change. • Developers have the option to limit discharge for all events to the QBAR flow rate; or install a complex discharge control which reflects the original discharge or run-off rates from the site across the range of storm events. E.g. QBAR, 3.3% (1in30), 1% (1in100), 1% (1in100) plus climate change and provide Long Term Storage for all runoff volume greater than the greenfield volume (as set out in 'Calculation of Storage Volume' below). Using complex	

Detail required for Full Applications	Provided?
controls is more expensive but reduces the amount of attenuation storage required on the site and is probably worth doing on larger sites. • It is understood that some guidance recommends minimum discharge rates of 5 l/s, to minimise use of small orifice openings that could be at risk of blockages. However, appropriate consideration of filtration features to remove suspended matter and suitable maintenance regimes should minimise this risk and therefore the minimum limit of 5l/s does not apply in Oxfordshire. • Due to the additional datasets that have been added to the Flood Estimation Handbook (FEH) since design rainfall events were developed originally in the Flood Studies Report (FSR) (NERC, 1975), rainfall depths obtained using FEH show significant differences from those obtained from FSR in some parts of the country. Within Oxfordshire, rainfall depths are often greater using more up to date FEH datasets than those using FSR, therefore for various storm events, greater run-off is produced, and additional attenuation is likely to be required. As FEH rainfall data is more up to date, calculations should use FEH data for surface water drainage design, except where the critical storm duration is less than 60 minutes, as it is recognised that FEH data is less robust for short duration storms. If FEH rainfall data is not used as described above, then sensitivity testing to assess the implications of FEH2013 rainfall must be provided. This should demonstrate that the development proposals remain safe and do not increase flood risk to third parties. • Based on the existing and proposed discharge cases calculated as above, the applicant should now have detailed calculations of storage volume required on site for the 1% (1in100) plus climate change case. • When running calculations, the LLFA expect Cv values should be set to 0.95 for roofed areas and 0.9 for paved areas. Default software values should not be used for storage estimate calculations. It is the designer's responsibility to justify why Cv values of less than 0.9 are deemed appropriate	
Calculations of storage volume All hydraulic calculations must be produced using approved software. Calculations of storage volume that will be required on site for the 1% (1in100) plus climate change case, bearing in mind the controlled discharge rate. Where appropriate this should specify the volumes of both attenuation storage and Long-Term storage. See also note above about use of FEH rainfall data. Plans should be provided clearly identifying where this storage will be provided, and the water level within each element for the design storm events. Storage elements should be designed to empty sufficiently within 24 hours to be able to accommodate 80% of the 10% (1in10) storm runoff.	
Infiltration design Where any discharge to ground by infiltration is proposed, details of the infiltration system will be required. Full infiltration testing results are required along with a summary of the infiltration rate taken for each infiltration element. Infiltration elements should be designed to half empty within 24 hours to be able to accommodate further rainfall events.	
Residual Risk As well as the consideration of the modelled events above, there should be a qualitative examination of what would happen if any part of the system fails, demonstrate that flood water will have flow routes through the site without endangering property and where possible maintaining emergency access/egress routes.	
Landscaping Proposals, where relevant, for integrating the drainage system into the landscape or required publicly accessible open space and providing habitat and social enhancement.	

Designing for exceedance For events with a return-period in excess of 3.3% (1in30), surface flooding of open spaces such as landscaped areas or car parks is acceptable for short periods, but the layout and landscaping of the site should aim to route water away from any vulnerable property, and avoid creating hazards to	

Detail required for Full Applications	Provided?
access and egress routes (further guidance in CIRIA publication C635 Designing for exceedance in urban drainage - good practice). No flooding of property should occur as a result of a 1% (1in100) storm event (including an appropriate allowance for climate change). In principle, a well-designed surface water drainage system should ensure that there is little or no residual risk of property flooding occurring during events well in excess of the return-period for which the sewer system itself is designed. This is called designing for exceedance. The CIRIA publication `Designing for exceedance in urban drainage-good practice' can be accessed via the following link: http://www.ciria.com/suds/ciria_publications.htm. If the drainage system has been designed to allow flooding on site is during the 1% (1in100) storm event (including an appropriate allowance for climate change), provide a plan clearly identifying where this flooding will occur. Any flooding of the site should be assessed to ascertain if is safe for the sites users. The depth and rate of flow of the flood water should be compared to Table 4 of "Supplementary Note on Flood Hazard Ratings and Thresholds for Development Planning and Control Purpose" May 2008 www.sciencesearch.defra.gov.uk/Document.aspx?Document=FD2321_7400_PR.pdf.	
Hydraulic calculations of the full drainage system All hydraulic calculations must be produced using approved software. All elements of the drainage system should be included in the model, with an explanation provided for any assumptions made in the modelling. 'Source control' modelling is not appropriate for a Full planning application. The model results should be provided for critical storm durations of each element of the system and should demonstrate that all the criteria above are met and that there is no surcharging of the system for the QBAR rainfall, no flooding of the surface of the site for the 3.3% (1in30) rainfall, and flooding only in safe areas for the 1% (1in100) plus climate change. See also note above about use of FEH rainfall data.	
Explanation of who will maintain and fund the maintenance of the proposed system over the lifetime of the development and evidence that access will be physically possible to carry out that maintenance, without entering others land. Ideally, SuDS features should be located within public space and a maintenance manual be produced to pass to the future maintainer. Full details will be required at Discharge of Conditions. **SuDS As Built and Maintenance Details** Prior to first occupation, a record of the installed SuDS and site wide drainage scheme shall be submitted to and approved in writing by the Local Planning Authority for deposit with the Lead Local Flood Authority Asset Register. The details shall include: (a) As built plans in both .pdf, CAD and .shp file format; (b) Photographs to document each key stage of the drainage system when installed on site; (c) Photographs to document the completed installation of the drainage structures on site; (d) The name and contact details of any appointed management company information.	

Phasing Explanation of how the site will adequately consider flood risk at all stages of the development. Avoiding interim developed phases that are unprotected. Phases can only progress if adequate flood mitigation measures are in place for that particular phase. This should avoid one small phase of the site being allowed to discharge at the calculated rate for a larger part of the entire development. Adequate flood risk measures for each individual phase should be able to stand alone, (until the entire site is completed), without themselves being at flood risk and without increasing flood risk for other parties.	

APPENDIX E: INFORMATION REQUIRED FOR RESERVED MATTERS APPLICATIONS

The following information should be provided for every drainage strategy submitted to the LLFA for consideration as part of any **Reserved Matters application**.

There may be additional details required where these have been requested as a planning condition on the Outline permission.

Detail required for Reserved Matters Applications	Provided?
Flood Risk Assessment/Drainage Strategy Please include all of the information listed in our guidance on Detail required for Full Application, as per Appendix D. If these details are not provided then there is a risk of drainage solutions proposed at a later stage impacting upon layout and arrangements, including landscaping.	
No development within 9m of any watercourse The detailed layout of the site should demonstrate that there is no development within 9m of the top of the bank of any ordinary watercourse, without prior consent. Access must be available to all reaches of watercourse to enable long term maintenance.	
Phasing Where the reserved matters application relates to one phase of a larger development, demonstrate that any flood risk measures required for this site will be in place prior to occupation (or other appropriate trigger), to avoid any interim developed phases that are unprotected. Phases can only progress if adequate flood mitigation measures are in place for that particular phase. Adequate flood risk measures for each individual phase should be able to stand alone, (until the entire site is completed), without themselves being at flood risk and without increasing flood risk for other parties.	

APPENDIX F: INFORMATION REQUIRED FOR DISCHARGE OF STANDARD CONDITIONS

DETAILS OF SUDS DRAINAGE DESIGN

In order to discharge any condition imposed relating to the detailed design of SuDS features, the details required are likely to vary on a site-by-site basis, however we would likely expect the following:

Detail Required for Standard Detailed Design Condition	Provided?
Details (i.e. designs, diameters, invert and cover levels, gradients, dimensions, materials and so on) of all elements of the proposed drainage system, to include pipes, inspection chambers, ACO drains, storage tanks, outfalls/inlets and swales. These must be supported by calculations.	
Cross sections of the control chambers (including site specific levels mAOD) and manufacturers' hydraulic curves should be submitted for all hydrobrakes and other flow control devices.	
Full specification for any permeable paving.	
Details of the attenuation pond dimensions, to include bank levels in relation to 'normal' and design water levels and surrounding land levels, plus cross sections through any raised sections of bank. This should demonstrate that adequate attenuation storage volume has been provided above 'normal' water level, providing an appropriate residual uncertainty allowance (freeboard) between top design water level and bank level of at least 300mm or that determined as being appropriate by a qualified engineer for safety and other factors, following the Environment Agency's revised guidance at https://www.gov.uk/government/publications/accounting-for-residual-uncertainty-an- update-to-the-fluvial-freeboard-guide. The available storage volume should account for any ballast or other permanent features within the pond.	

ADOPTION AND MAINTENANCE OF SUDS FEATURES

In order to discharge any condition imposed relating to the adoption or ownership and maintenance of SuDS features, we would expect a SuDS Management Plan or Schedule setting out the following:

Detail Required for Standard Adoption and Maintenance Condition	Provided?
Details of which organisation or body will be responsible for vesting and maintenance for individual aspects of the drainage proposals (individual properties/curtilages, roads, special areas etc) with evidence that the organisation/body has agreed to such adoption. Where the agreement is subject to other legalities, it may be acceptable to provide agreement-in-principle.	
Details of which organisation or body will be the main maintaining body where the area is multifunctional (e.g. open space play areas containing SuDS) with evidence that the organisation/body has agreed to such adoption. If different to the main maintaining body, details of the landowner(s) must be provided.	
A maintenance schedule setting out which assets need to be maintained, at what intervals and what method is to be used.	
A site plan including access points, maintenance access easements and outfalls. Maintenance operational areas to be identified and shown on the plans, to ensure there is room to gain access to the asset, maintain it with appropriate plant and then handle any arisings generated from the site for example by providing a silt deposit area and cut weed composting area for large ponds.	
Details of expected design life of all assets with a schedule of when replacement assets may be required.	

VERIFICATION OF INSTALLED DRAINAGE SYSTEM

In order to discharge any condition imposed relating to verification of drainage systems being installed as approved, we would expect a Verification Report to be submitted prior to occupation of the site, setting out the following:

Detail Required for Standard Verification Condition	Provided?
A report produced by a suitably qualified and competent drainage engineer. The individual or company should have suitable professional indemnity insurance and will normally be independent of the developer / contractor / subcontractor to ensure there is no conflict of interest.	
Evidence that the drainage has been installed in accordance with the approved details and that any departure from the agreed design is in keeping with the approved principles.	
As-built drawings and accompanying photos.	
Results of any performance testing undertaken as part of the application process (if required/necessary.	
Copies of any statutory approvals, such as Land Drainage Consent for discharges.	

APPENDIX G: CLIMATE CHANGE ALLOWANCES FOR RAINFALL

On 6th October 2021, the Environment Agency published new guidance on the climate change allowances that should be used in the assessment of flood risk. This guidance can be found on the GOV.UK website at:

Flood risk assessments: climate change allowances

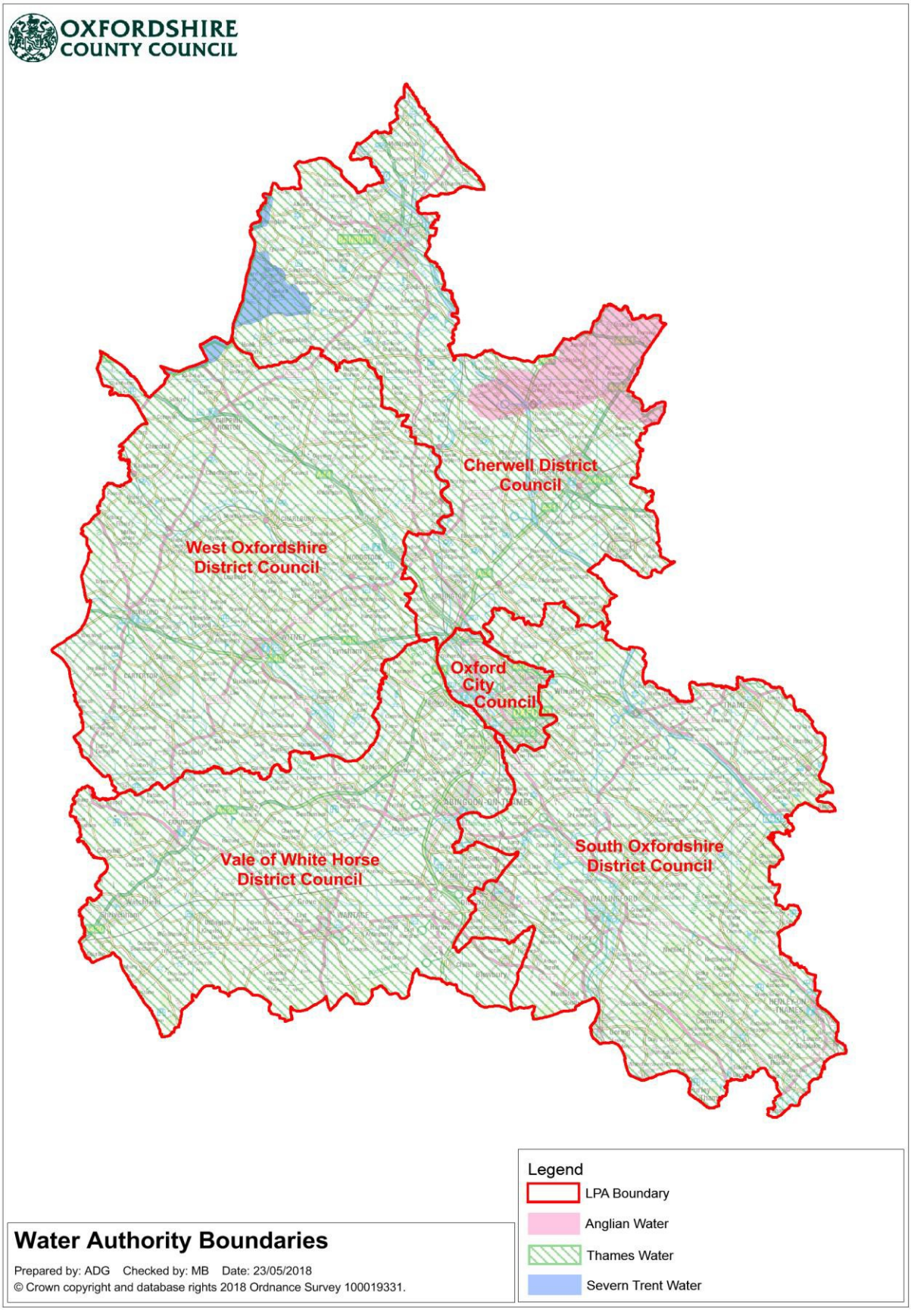
For assessment of rainfall intensity allowances, Table 1 of the guidance provides two allowances based on central and upper end predictions of climate change impacts.

Under the new guidance, for development with a design life to 2060-2115, Oxfordshire County Council (OCC) expects that all developers should design the surface water attenuation on site to accommodate upper end +40% climate change allowance. If the implications are significant i.e. the site could flood existing development (by allowing additional flow of runoff from the site) or put people at risk (as a result of increased hazard levels within or off the site) then a view may be taken to provide more attenuation within the drainage design up towards the +40% allowance, or to provide additional mitigation, for example a higher freeboard to ensure no risk to third parties/onsite users for the +40% allowance. This will tie into existing principles for designing for exceedance. OCC may also request that the +40% allowance is accounted for on development sites which could have a direct impact on sites of known flood risk, where no other mitigation is proposed.

Transitional arrangements: The new climate change guidance needs to be considered in the FRA/drainage design for all developments submitted for planning permission on and after 6th October 2021, even if the technical work was completed in advance of this date.

Please note that this advice only considers the surface water drainage impacts of development – for advice relating to fluvial flooding you would need to consult directly with the Environment Agency.

APPENDIX H: MAPS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West Oxfordshire District Council
Oxford City Council
Vale of White Horse District Council
South Oxfordshire District Council
Legend
LPA Boundary
Anglian Water
Thames Water
Severn Trent Water
Water Authority Boundaries
Prepared by: ADG Checked by: MB Date: 23/05/2018
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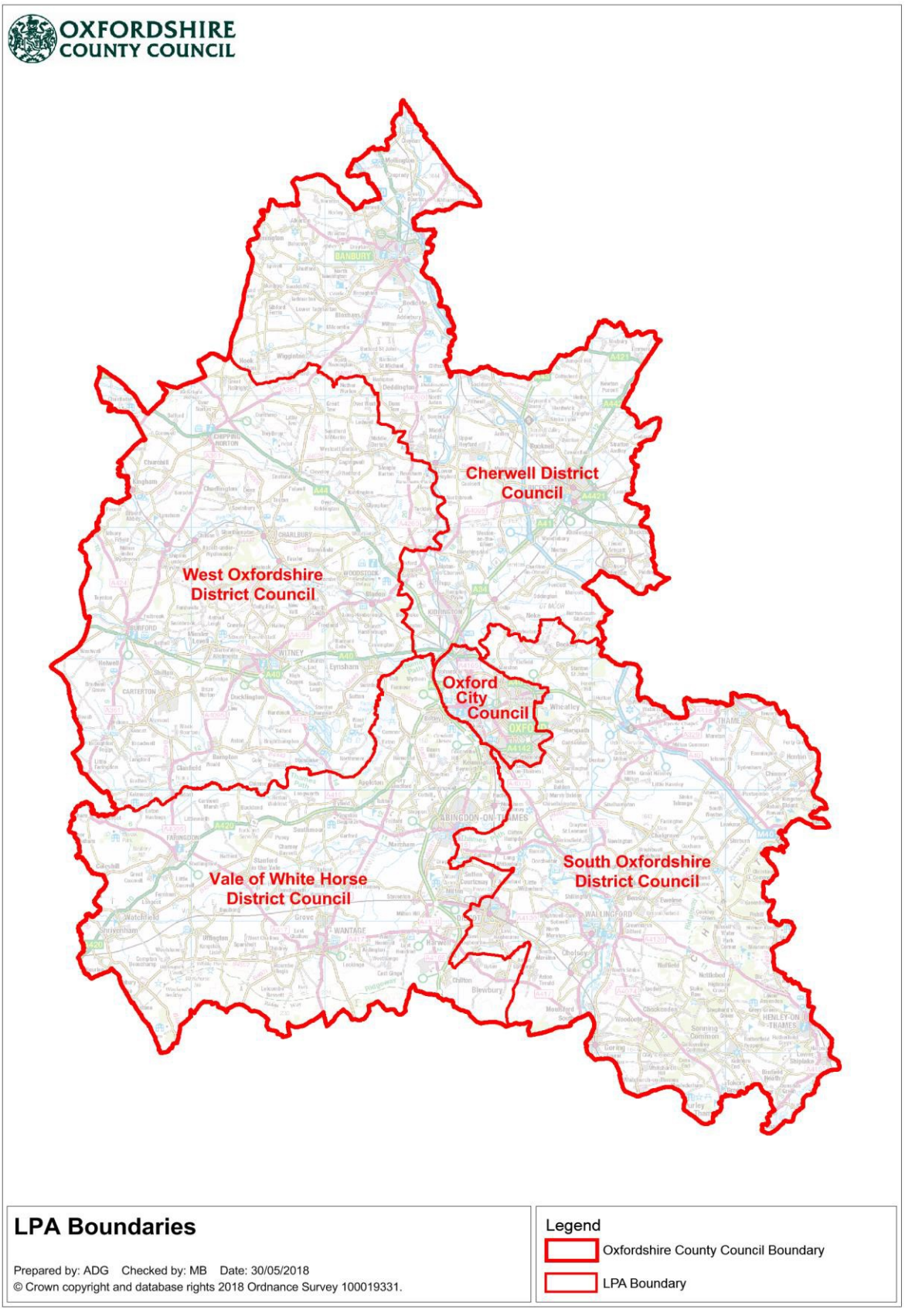
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Oxford City Council
Vale of White Horse District Council
South Oxfordshire District Council
LPA Boundaries
Prepared by: ADG Checked by: MB Date: 30/05/2018
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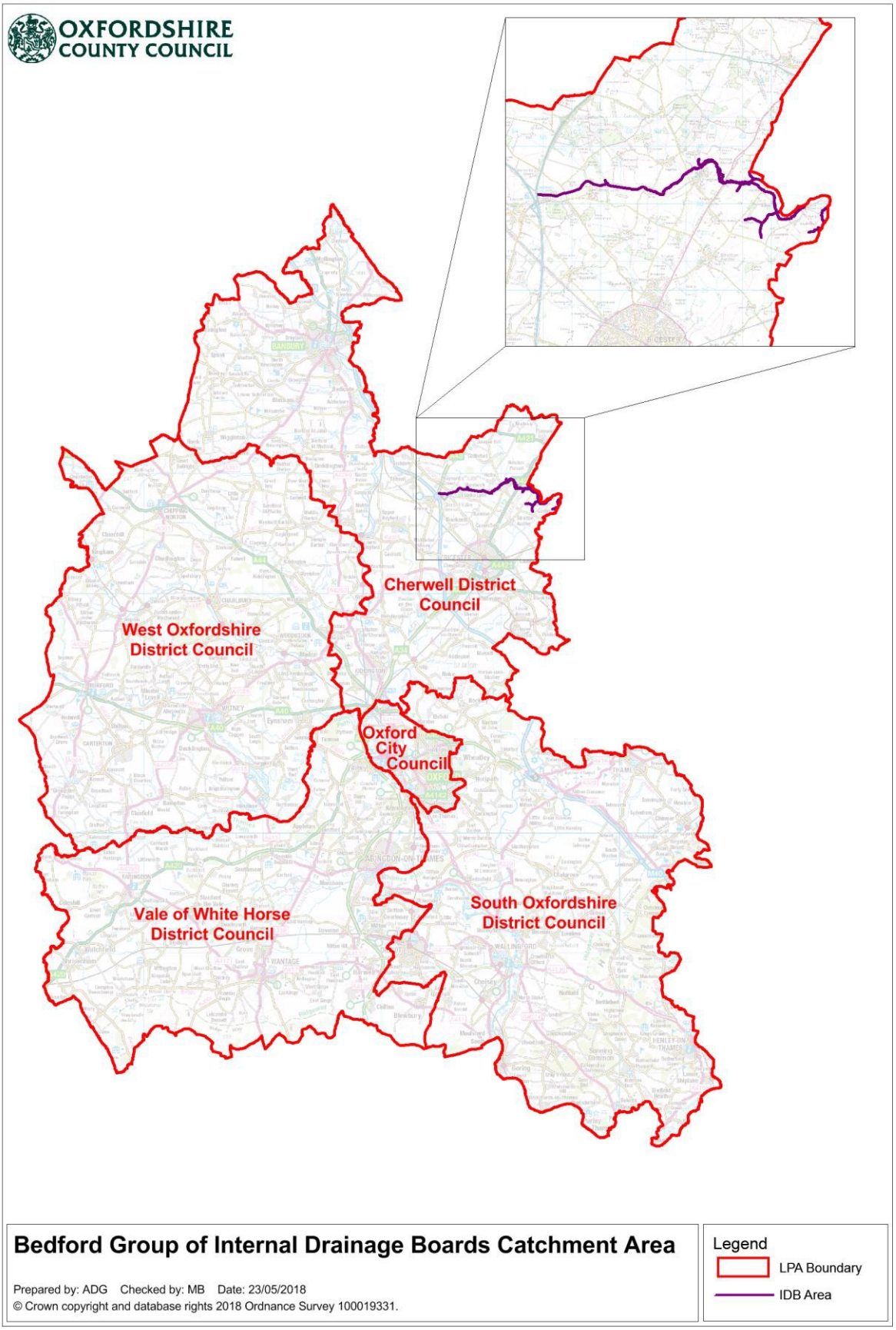
Legend
Oxfordshire County Council Boundary
LPA Boundary


OXFORDSHIRE COUNTY COUNCIL
Cherwell District Council
West Oxfordshire District Council
Oxford City Council
Vale of White Horse District Council
South Oxfordshire District Council
Bedford Group of Internal Drainage Boards Catchment Area
Prepared by: ADG Checked by: MB Date: 23/05/2018
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Legend
LPA Boundary
IDB Area

APPENDIX I: GLOSSARY

BGS – British Geological Survey

BI – Blue Infrastructure

BREEAM – Building Research Establishment Environmental Assessment Method

CAAP – Central Area Action Plan

CDM – Construction Design and Management Regulations

CFMP – Catchment Flood Management Plan

CEMP – Construction Environmental Management Plan

CESWI – Current Edition of the “Civil Engineering Specification for the Water Industry”

CIRIA – Construction Industry Research and Information Association

CRT – Canal and River Trust

Defra – Department for Environment, Food and Rural Affairs

DCLG – Department for Communities and Local Government

EA – Environment Agency

FEH – Flood Estimation Handbook

FRA – Flood Risk Assessment

FRMP – Flood Risk Management Plan

FSR – Flood Studies Report

FWMA – Flood and Water Management Act 2010

GI – Green Infrastructure

GIS – Geographical Information System

HA – OCC Highways Authority

IDB – Internal Drainage Board

JPU – Joint Planning Unit

LFRMS – Local Flood Risk Management Strategy

LLFA – Lead Local Flood Authority

LPA – Local Planning Authority

NA – National Highways

NPPF – National Planning Policy Framework 2021

OCC - Oxfordshire County Council

RBMP – River Basin Management Plan

SDDC – Sustainable Drainage Design Code

SFRA – Strategic Flood Risk Assessment

SHW – Manual of Contract Documents for Highway Works Volume 1 Specification for Highway Works

SuDS – Sustainable Drainage Systems

SWMP – Surface Water Management Plan

WCS – Water Cycle Strategy

WFD – Water Framework Directive