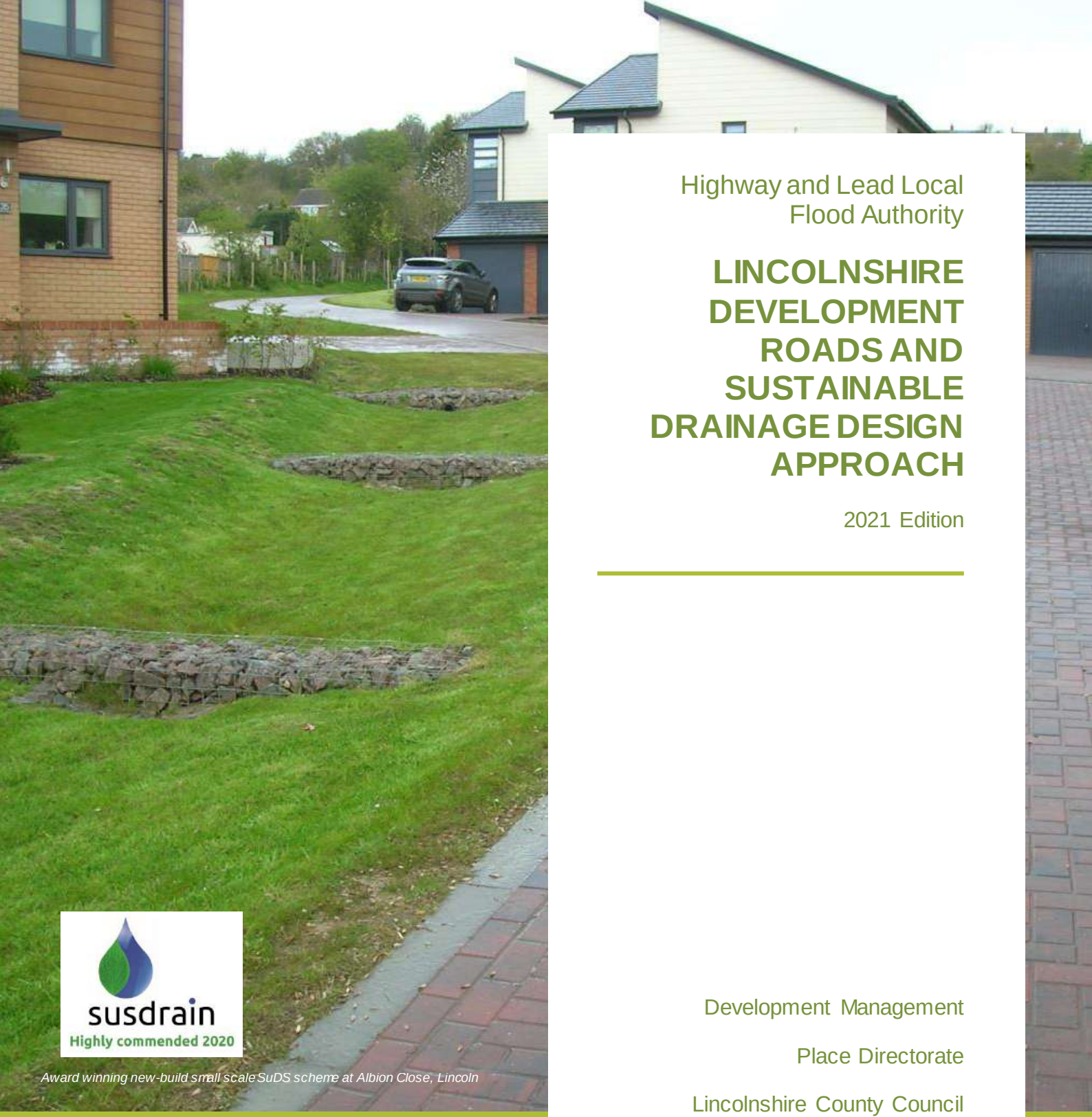


Award winning new-build small scale SuDS scheme at Albion Close, Lincoln

Highway and Lead Local Flood Authority

LINCOLNSHIRE DEVELOPMENT ROADS AND SUSTAINABLE DRAINAGE DESIGN APPROACH

2021 Edition

Development Management

Place Directorate

Lincolnshire County Council

Foreword

This Lincolnshire Development Roads and Sustainable Drainage Design Approach should be read in conjunction with the updated Lincolnshire Development Road and Sustainable Drainage Specification and Construction 2020 document.

This Development Design Approach aims to assist Developers to ensure that all new developments carried out within Lincolnshire do not have a detrimental effect on road safety and local flood risk, and where necessary, developer contributions are sought to facilitate the provision of a safe and multi-modal access to the development or transport infrastructure improvements. New development should also aim to provide a net biodiversity gain and improve local amenity.

The key objective of this approach is to link local policies, design principles, technical requirements and priorities with national policies. This Design Approach recognises the dual responsibilities of Lincolnshire County Council (LCC) as Highway Authority (HA) and Lead Local Flood Authority (LLFA) in the land use planning process and exercises these responsibilities in an integrated approach as Highway and Lead Local Flood Authority (HLLFA).

We aim to support all those involved in the development of new highways, related sustainable surface water drainage (SuDS) and the management of local flood risk (i.e. surface water, groundwater and from ordinary watercourses) across Lincolnshire, to help deliver exemplar developments in line with the latest Government requirements and industry best practice.

This design approach is a "living document" and we welcome your feedback and comments on its content and use.

Head of Development Management, Highway & Lead Local Flood Authority, Lincolnshire County Council

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Introduction

Lincolnshire is a large rural County that has one of the fastest growing populations, rising much faster than regional and national rates. Lincolnshire's roads and infrastructure are very important to the County's economic development and well-being. Lincolnshire County Council (LCC) is both the Highway Authority (HA) and the Lead Local Flood Authority (LLFA).

As HA, it is a statutory consultee for all Planning Applications received by the District Councils and the County Council, whereas, as the LLFA it has the responsibility to lead in managing local flood risk. This includes being a statutory consultee in the planning process for surface water management relating to Planning Applications for all Major Developments (i.e. *10 dwellings or more; or equivalent non-residential or mixed development*). Sustainable Drainage Systems (SuDS) should be considered and implemented where appropriate. Combining these HA and LLFA responsibilities, the HLLFA responds to around 8,000 planning applications per annum. Officers within the HLLFA Development Management Team carry out this function.

It is clear that in dealing with these applications, and in particular large commercial and residential sites, that the effect of increased traffic, increased surface water drainage and the potential increase in local flood risk generated by such developments, needs to be given careful consideration.

LCC welcomes and supports economic growth; in particular that which enriches the quality of life of its people. Developers will be required to ensure that such growth is not to the detriment of highway safety, disruption to the road network, and local flood risk. Indeed, they may be expected to contribute to improvements to the road, drainage and flood risk network to facilitate sustainable development proposals.

We offer free pre-application advice to developers and recommend that they contact us at the earliest opportunity to discuss their development proposals.



Key National and Local Guidance

The following is a brief introduction to the main documents concerning transport, SuDS and local flood risk issues.
Please refer to page 73 for other useful guidance documents.

National Planning Policy Framework (NPPF)

The framework acts as guidance for local planning authorities and decision-takers, both in drawing up plans and making decisions about planning applications. This Policy Framework must be taken into account in the preparation of local and neighbourhood plans, and is a material consideration in planning decisions.

Planning Practice Guidance (PPG)

The Guidance supports the NPPF and contains more detailed useful information on a range of development related topics including climate change, design, SuDS, flood risk assessment, environment, housing, transport and travel assessments etc.

Local Plans

Local Plans are the responsibility of the Local Planning Authority who should be contacted at the earliest stage in the planning process. Local Plan documents set out the strategic priorities for development of an area. With regard to the interests of the HLLFA, Local Plans will include policies to deliver: housing, retail, leisure and other commercial development; infrastructure for transport, water supply, sewage treatment, surface water drainage; and protection of homes and property from flooding from rivers and the sea.

Manual for Streets (MfS)

Published by the Government, it replaces Design Bulletin 32 and 'Places, Streets and Movement'. It focuses mainly on residential streets and putting well-designed streets at the heart of sustainable communities. Amongst other things, it updates the link between planning policy and street design; includes revised design guidance; and places strong emphasis on a coordinated design approach. Supplementary guidance is also provided in Manual for Streets 2.

Sustainable Drainage Systems (SuDS) Manual - (CIRIA C753)

The Guidance covers the planning, design, construction and maintenance of SuDS to assist with their effective implementation within both new and existing developments. It is a compendium of good practice, based on existing guidance and research, and provides a framework for designing sustainable drainage.

Sustainable Drainage Design and Evaluation Guide

This guide links the design of SuDS with the evaluation requirements of planning in a sequence that mirrors the SuDS design process. The document promotes the idea of integrating SuDS into the fabric of development using the available landscape spaces as well as the construction profile of buildings. This approach provides more interesting surroundings, cost benefits and simplified future maintenance.

Lincolnshire Development Road and Sustainable Drainage Specification and Construction (DR&SDS&C)

This recently updated document provides the HLLFA's detailed specification, standards and requirements for materials, construction and maintenance of roads and sustainable drainage necessary to enable adoption as public highway and features, maintainable at public expense.

Development and Flood Risk Guidance for the Construction Industry – (CIRIA 624)

The document provides guidance to Developers and the construction industry on the implementation of good practice in the assessment and management of flood risk as part of the development process and is intended to promote development that is sustainable in terms of flood risk.

What We Assess

Early Discussion on Highway, Drainage and Flood Risk Infrastructure Principles and Strategic Objectives

The planning application process and the HLLFA highway and drainage adoption process are inextricably linked. Therefore, all highway, drainage and flood risk infrastructure principles and strategic objectives should be discussed with the HLLFA at the earliest possible stage in the development design process.

In the first instance, developers are encouraged to contact the HLLFA for an initial discussion prior to formal pre-planning and pre-adoption application discussions being made through the LPA.

Developers are also encouraged to attend Multi-Agency Group (MAG) meetings convened by LPAs, to enable collective site specific planning discussions with all risk management authorities (RMAs).



Responses to Planning Applications

The HLLFA will provide an integrated response (i.e. highways, SuDS and local flood risk) to the LPA at all stages of the land use planning process.

When considering an application, the HLLFA may "secondary consult" with IDBs, the Environment Agency (EA) and Water and Sewerage Companies (W&Sc), prior to providing a statutory response to the LPA.

Responses to Planning Applications

Generally, one of the following responses will be made:

- No objections to the proposals;
- Request for conditions to be attached to any planning permission granted; or
- Request for refusal of the application.

There may be occasions where, in order to make a comprehensive response, further details are requested from the applicant.

The NPPF expects SuDS to be considered where appropriate for all Major developments. Therefore, the HLLFA will make an appropriate integrated response to planning applications depending on whether Major or Minor development is proposed. *(i.e. Major Development being 10 dwellings or more; or equivalent non-residential or mixed development, or 1 Ha and above and Minor Development being less than 10 dwellings, or equivalent non-residential or mixed development, or below 1 Ha)*.

The extent of detail of the information provided should be appropriate to the size and complexity of the proposed development, and in addition to reference to the Appendices; further guidance can be provided by the HLLFA Development Management Team.

Planning Conditions – Definition

The HLLFA in reviewing development proposals will consider whether otherwise unacceptable development could be made acceptable through the use of conditions or planning obligations. Planning obligations should only be used where it is not possible to address unacceptable impacts through a planning condition.

Section 106 Contributions (Planning obligations) will only be sought where they meet all of the following tests:

- necessary to make the development acceptable in planning terms;
- directly related to the development; and
- fairly and reasonably related in scale and kind, to the development.

Planning conditions will only be requested where they are necessary, relevant to planning and to the development to be permitted, enforceable, precise and reasonable in all other respects.

Refusals

Where the HLLFA considers the residual cumulative transport impacts of development are severe, it will request the planning authority to refuse an application on one of more of the following grounds:

- Significant amounts of transport movement is not supported by a Transport Statement or Transport Assessment;
- Opportunities for sustainable transport modes have not been taken up depending on the nature and location of the site, so reducing the need for major transport infrastructure;
- Safe and suitable access to the site cannot be achieved for all people; and
- Improvements cannot be undertaken within the transport network that cost effectively limits the significant impacts of the development.

Where the HLLFA considers highway drainage not to be sustainable, and/or where local flood risk has not been appropriately taken into account and mitigated, it will request the planning authority to refuse an application.

Appeals

When an application has been refused the applicant has the right to appeal to the Secretary of State. The appeal can be dealt with in three different ways:

Written Representation - each side provides a written statement to the Planning Inspectorate;

Informal Hearing - written evidence is submitted to the Inspectorate, who arranges a hearing, attended by an Inspector. Both sides present their evidence and are given the opportunity to discuss the merits of each side's arguments. A site visit may be made. The Inspector writes to each side with the formal decision; and

Public Inquiry - similar to the informal hearing except that the evidence is presented formally and tested by cross-examination. Each side usually has legal representation. Members of the public who have made representations on the application are also allowed to give evidence.

Integrated Approach to Highways and SuDS

Highways, SuDS and flood risk mitigation and assessment should be considered in an integrated manner by the developer to create good 'whole site' design, which is similarly how we assess and respond to planning applications.

The whole site scheme design of the development should (as a minimum), consider the topic areas shown below:

Topic Area		Primary Purpose Includes:
1	Topographic site survey and analysis	Establish site characteristics such as natural contours, sub-catchments, surface water flow paths and land levels etc.
2	Flood Risk Assessment or Flood Risk Statement	Determine the probability and consequences of flood risk from all sources, and where necessary, determine appropriate mitigation measures required to reduce flood risk.
3	Ground investigations	Provide evidence of groundwater levels along with type and nature of soils and sub-soils, and their capacity for infiltration and structural loading.
4	Infrastructure layout plans	Ensure at the early stages of development, that sufficient space is allocated to accommodate all necessary essential infrastructure in a way that benefits from the natural characteristics of the site, and is outside vulnerable areas.
5	Highway design proposals	Build on the infrastructure layout plans and establish in detail, the necessary highway, transport, parking, access and egress etc. requirements to service the development. Propose suitable constructions to enable formal adoption by the HLLFA (where required). Highway design should consider permeability and connectivity within the site and to the surrounding community, with priority given to the movement of pedestrians and cyclists over the private car. Streets should be easy to navigate, with clear hierarchies and characters. Highway design should enhance the sense of place and create multi-functional spaces where residents can socialise and play.
6	SuDS design proposals	Build on the infrastructure layout plans and establish necessary sustainable surface water drainage requirements to effectively drain the highway. Propose suitable layouts and constructions (including temporary drainage arrangements), to enable formal adoption by the HLLFA (where required).
7	Landscape design proposals	Build on the infrastructure layout plans and establish landscape and planting requirements to serve the integrated needs of highways, sustainable drainage, natural habitat, biodiversity and amenity. Propose suitable layouts and constructions to support the formal adoption of highways

		and drainage by the HLLFA (where required).
8	Net biodiversity gain.	Have regard to the Government's intention to mandate net biodiversity gains, plan for and provide these net biodiversity gains on all new development sites where possible.
9	Enhanced amenity.	Where possible as part of new development proposals, improve and enhance the local amenities available to local communities living and working in the development area. Multiple use benefits of amenity areas should be optimised.
10	SuDS construction management plan, method statements and phasing plans.	Ensure all reasonable steps are planned and instigated to safely and appropriately construct SuDS components and manage flooding and pollution risks during all construction phases. Where necessary, temporary works and mitigation measures should be designed and constructed, having regard to construction challenges, and the potential adverse impacts of construction activities on SuDS assets and their function, during and between construction phases.
11	SuDS operation and maintenance plans.	Ensure that for the lifetime of the development, all necessary routine/regular, occasional and remedial maintenance activities (including SuDS asset life and replacements), are planned (and minimised), in the design and layout of SuDS solutions. These activities should be clearly documented and provided in the form of a SuDS operation and maintenance plan, to the HLLFA prior to Adoption.
12	Health and Safety requirements.	Ensure the development site remains safe and provision of the CDM requirements. (HLLFA interest at Sec 38 Adoption stage.)

In addition to the Developer's overall objective of providing a building or structure on the site that delivers the intended use, specific integrated principles and strategic objectives relating to highways, SuDS and local flood risk infrastructure need to be agreed with the HLLFA at the outset. In any new development it is important that the drainage of the site, including taking account of extreme weather events, is considered as early as possible in the design process.

Traditionally, highway drainage and local flood risk have, in many cases, been a secondary consideration when determining the development site layout, number and type of buildings. This has led to some built developments with inadequate space and sited in inappropriate locations, with insufficient areas of land remaining for essential infrastructure. However, with the Governments requirement for SuDS for the management of run-off for all Major Developments, this traditional approach, particularly regarding highways, drainage and local flood risk infrastructure is no longer appropriate.

The distribution and layout of buildings on a site can greatly influence the potential for creating flood pathways and affect flood risk to property. The integrated Concept is the first of four stages of integrated design and construction:

1) Concept;

2) Outline;

3) Detailed; and

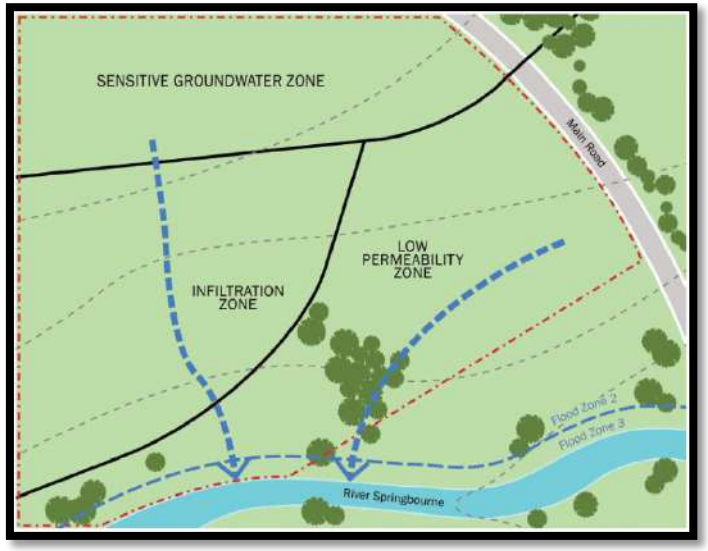
4) Adoption.

A number of hierarchical Key Stages and Steps should be taken to reflect the principles and strategic objectives of the development, and establish appropriate infrastructure layout plans for the site; prior to proceeding to the Outline and Detailed Design Stages. Steps to establish infrastructure plans as part of the whole site design process are shown below:

Whole Site Scheme Design Process	
Stage 1	Concept (Infrastructure Layout Plans)
Step 1.1	Agree principles and strategic objectives.
Step 1.2	Determine site characterisation.
Step 1.3	Determine development characterisation.
Step 1.4	Establish SuDS design criteria.
Step 1.5	Identify feasible points of discharge.
Step 1.6	Define surface water sub-catchments and flow routes - including exceedance flows
Step 1.7	Select SuDS components for the Management Train.
Step 1.8	Optimise the Management Train.
Step 1.9	Provide the conceptual design.
Stage 2	Outline Design
Stage 3	Detailed Design
Stage 4	Adoption

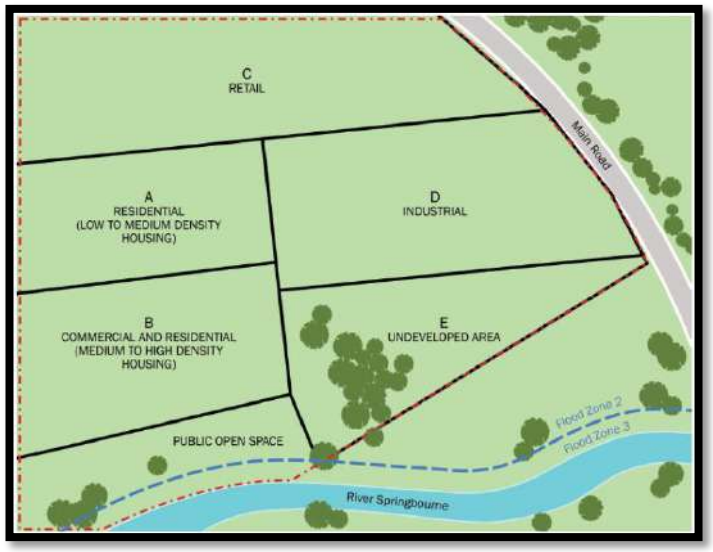
Step 1.2 Determine site characterisation

This shows key natural characteristics and early influences on the way the site should be developed (e.g. site topography and contours, overland surface water flow routes, ground strata, permeability and sensitivity to pollution, river flood zones, existing trees and landscape and existing adopted highway.)



Step 1.3 Determine development characterisation

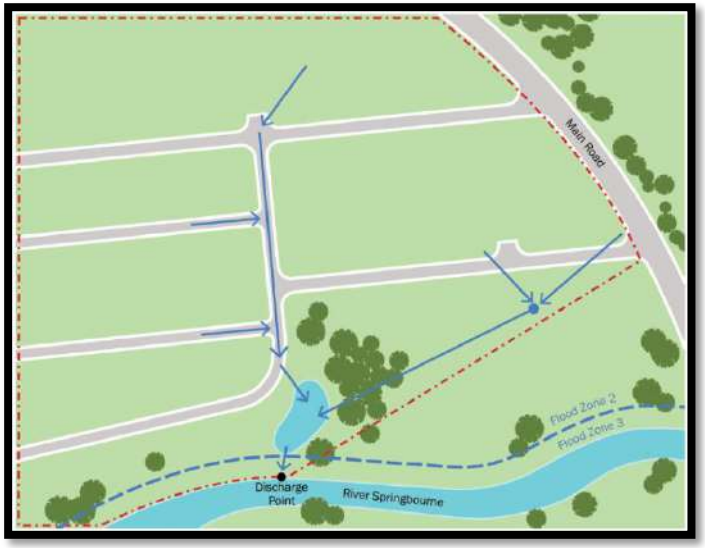
This shows the proposed development characteristics separated in areas across the site, having first had regard to the natural characteristics and early influences shown in Step 1.2. This proposed development layout, for example: places residential areas out of flood risk areas and provides public open space in areas at risk of flooding from the river; places retail activities in the sensitive groundwater zone, commercial and residential development in the infiltration zone (enabling potential for SuDS infiltration methods), and industrial activity out of the flood risk area and in the low permeability zone (reducing the risk of groundwater pollution); and provides protection to existing trees and landscape in the undeveloped area.



(Courtesy of the SuDS Manual)

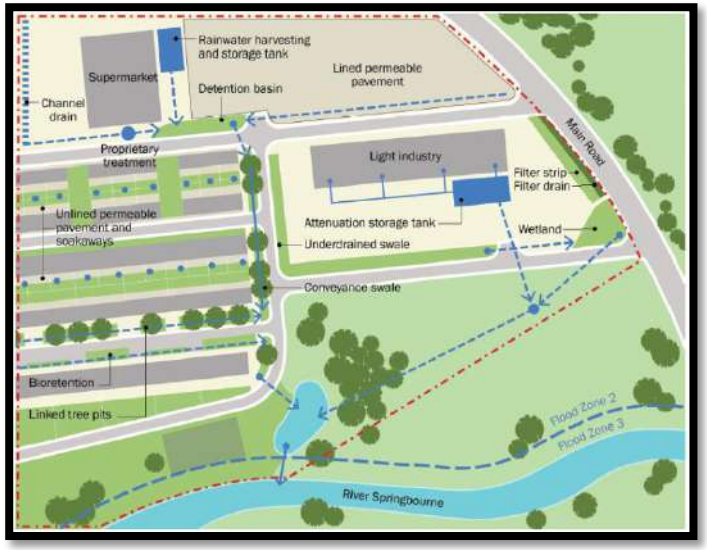
Step 1.6 Define surface water sub-catchments and flow routes, including exceedance flows

This shows the proposed highway infrastructure around the development zones, and the way it can be used to accommodate surface water flows from the site to safely discharge into the river. Consideration of sub surface and overland (design exceedance) flows is shown in the form of an indicative conceptual SuDS management train leading to a discharge point.



Step 1.9 Provide the conceptual design

This shows the proposed conceptual design of the development zones (land uses) across the site, together with the proposed methods of draining surface water from each of these zones using sustainable drainage techniques (e.g. storage, permeable pavements, swales, filter strips and filter drains, bio retention, wetland and pond).



(Courtesy of the SuDS Manual)

Planning Stages

Design layouts, drawings and calculations etc. should be proportionate to the complexity of the proposed development, difficulty of topography/ground conditions and the degree of flood risk etc. The HLLFA will provide further advice on proportionality with regard to specific sites if required. The first three recommended combined process stages for "whole site scheme" design is shown below:

Combined Process Stages	Planning	Design
Stage 1	Pre-application discussion	Concept
Stage 2	Outline Application	Outline
Stage 3	Full Application and/or Approval of Reserved Matters	Detailed

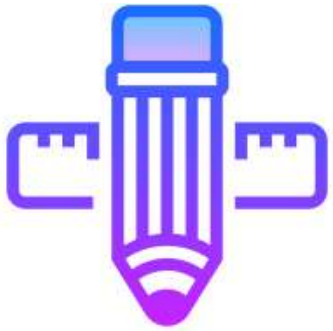
Each stage builds on the information and technical detail provided at the previous stage. Further summary information on the likely design information that may be required is provided below.

Stage 1 – Pre- Application/ Concept Design



- Natural Drainage Catchment Plan showing land contours, topography and watercourses both surrounding and impacting the site.
- Site Location Plan showing existing use of site, supported by recent photographs.
- Existing site layout plan showing overall topography (ground level contours) across the site, the position of roads, access points, footpaths, road drains, watercourses and any other flood risk or surface water drainage features that need to be taken into account.
- Level 1 Flood Risk Assessment/Statement (including opportunities to reduce flood risk to and from the site).
- Infrastructure layout plans, of the proposed development layout (or layout options), showing the location of roads and sustainable drainage features, essential services, plus any potential flood risk protection features that may be required.
- Outline sizing of site layout areas/zones to confirm sufficient area for highways and SuDS allowed.
- Potential opportunities to provide net biodiversity gain and enhanced local amenity.

Stage 2 – Outline Application/ Outline Design



- Proof of concept information building on that provided at Stage 1.
- Increased amount of technical detail on proposed development layout of highway, SuDS and local flood risk mitigation work.
- Preliminary/summary technical drawings and calculations.
- Topographic Survey.
- Level 2 Flood Risk Assessment/Statement (including opportunities to reduce flood risk to and from the site).
- Desktop Ground Investigation Report.
- Highway Design Proposals.
- Drainage Strategy or drainage proposals (including preliminary hydraulic calculations.
- Outline whole site development Construction Management Plan, Method Statements and Phasing Plans.
- Outline whole site SuDS scheme Operation and Maintenance Plan (including Adoption).
- Water Quality Treatment Measures (refer to *Ciria Simple Index Approach)
- Whole Site Landscape Plan.
- Outline proposals to provide net biodiversity gain and enhanced local amenity.
- Results of initial site investigations and how these influence development aspects of the site.

Stage 3 – Full Application/ Reserved Matters/ Detailed Design



- Build on the information provided at Stage 2.
- Full technical details of all aspects of the proposed development layout of highway, SuDS and l ocal flood risk mitigation work.
- Technical drawings and calculations.
- Topographic Survey (including contours and cross-sections).
- Level 3 Flood Risk Assessment/Statement (including opportunities for flood risk reduction measures to the site - possibly by others, and flood risk reduction measures for surface water run-off from the site).
- Geotechnical Interpretive Report.
- Detailed Highway Design Proposals
- Detailed proposals to provide net biodiversity gain.
- Detailed proposals to provide enhanced local amenity.
- Detailed whole site development Construction Management Plan, Method Statements and Phasing Plans, (including how drainage and highways assets will be protected and operate effectively, as the phases of development are built out).
- Whole site SuDS scheme Operation and Maintenance Plan (including SuDS asset replacement and Adoption).
- Water Quality Treatment Measures. (ref. to *Ciria Simple Index Approach)
- Whole site Landscape Plan.
- Health & Safety Plan. (HLLFA requirement for Section 38 Agreement only)

Masterplanning

A masterplan is a framework for the overall concept design of a development site, designed to be used as a long-term planning document. Producing a masterplan for multi-phase developments is critical to ensure the best design outcomes, and should be developed at the aforementioned Stage 1 and Stage 2. You should seek advice from the LPA on their requirements for the masterplan as the document will typically also include information outside of the HLLFA's remit; however the suggested contents for matters relating to the HLLFA are detailed below.

Understanding the context

This links back to the integrated approach discussed earlier, in particular the Tables on page 9 and 11. The masterplan design should incorporate and enahnce existing site features, so it is vital to understand and analyse the site context.

Landscape

- Ground conditions
- Topography and existing flow paths
- Existing green infrastructure such as trees and hedgerows
- Existing blue infrastructure such as ponds and watercourses
- Environmental risks such as flooding and water quality
- Biodiversity

Movement

- Vehicular access
- Existing footpaths - designated PRoWs and well-used routes
- Cycle paths
- Links to existing services and facilities
- Public transport
- Desire lines
- Links between urban and rural areas

Design

- Character of local roads and footways
- Street hierarchy
- Street character
- Materials
- Multi-functional spaces
- SuDS
- Strategic and large scale landscaping

Statutory and Legal Constraints

- Land ownership
- Public Rights of Way
- Statutory Undertakers services
- Easements
- Planning conditons
- Covenants
- Ownership of watercourses

Once these principles have been established, a broad concept plan and structure of the layout should be produced, supported by illustrations and diagrams capturing the design vision. It is important to also consider the phasing, delivery and ongoing maintenance and management of the site at masterplan stage.

Place Design

Innovative layouts and landscaping, which promote sustainability and place, are key considerations in highway design. Typically, modern residential estates should have a clear hierarchy with routes designed to accommodate the movement of people. Good design should consider the need generated along each route within the site, and include variations in road design, widths, materials and landscaping to respond to this. This could include the use of single footpaths, shared space and edge lanes. Edge lanes front public open space and provide adoptable connections for public use, therefore reducing the requirement for traditional private drives and turning heads. Road layouts should be designed to reduce the need for turning and manoeuvring, by providing permeable links between streets that allow vehicles to traverse the site in a forward gear.

Highway designs should also encourage sustainable patterns of movement whilst reflecting the anticipated pedestrian, cycle and vehicle usage and desire lines. Layouts should be designed to ensure that vehicle speeds are kept low and traffic is not encouraged to use new estates as through routes. It should be remembered that streets should be designed to allow social interaction and encourage all modes and not just the free flow of vehicular traffic. Designs should promote an inclusive environment that recognises the needs of people of all ages and abilities, such as the importance of way-finding and legibility. Consideration should be given to ensure adequate facilities are provided to enable residents of new estates to gain easy access to essential services. We encourage innovation with a flexible approach to street layouts and use of locally distinctive, durable and maintainable materials which enhance street character types. All designs should use the minimum of highway infrastructure necessary to make the streets work properly; the starting point for any well designed street is to begin with nothing and then add only what is necessary in practice.

Access for emergency services must be observed throughout the site.

Information and advice on the design principles for highways, SuDS and flood risk mitigation should be sought from the HLLFA at the earliest opportunity.

Particular attention will need to be given to the following:

Public Transport

In all new residential developments, the potential for improved public transport accessibility needs to be assessed, whether this is through direct access or via links to the existing network. Pedestrian and cycle links to public transport facilities which are safe, secure and well-lit may be required as part of the new development.

Walking and Cycling

It is important that designs consider and incorporate existing pedestrian/cyclist movement patterns within and surrounding the site, including public rights of way and existing desire lines. The layout should respond adequately to the needs of pedestrians and cyclists providing connections to existing highway infrastructure, adjacent residential areas and amenity space. Consideration should be given to the circumstances in which residents will need to walk/cycle to schools, shops, doctors, bus stops etc. The use of separate footway and/or cycle links into/out of estates are encouraged and indeed will generally be required on cul-de-sacs over 200m in length.

Footway and cycle networks should be planned and designed to allow people to reach their day to day destinations easily, along routes that connect, are simple to navigate and are of a consistently high quality.

Those routes should be at least as direct – and preferably more direct – than those available for private motor vehicles.

Not only should the infrastructure be safe, it should also be perceived to be safe for that users feel more able to use it.

Comfortable conditions for cycling and walking require routes with good quality, well-maintained smooth surfaces, adequate width for the volume of users, minimal stopping at starting (such as at junctions where they do not have priority) and avoiding steep gradients.

This infrastructure should help to deliver public spaces that are well designed and finished in attractive materials and be places that people want to spend time using.

It is important that new developments do not put up barriers to any sections of the community. Care must be taken when designing new estates to ensure adequate access and facilities are provided for all. Pedestrian crossings at junctions should be located in the most convenient location that does not expose the users to dangers from vehicular traffic.

Developers are recommended to refer to the Department for Transport's document "Inclusive Mobility A Guide to Best Practice on Access to Pedestrian and Transport Infrastructure", "Gear Change: A bold vision for cycling and walking" and Local Transport Note 1/20.

Street Furniture

The HLLFA encourage the use of street furniture in the right places to enhance the sense of place and allow for multi-functional use of the space (i.e. for the movement of people, to socialise and to play).



Landscape and Tree Design

Planting should be designed by integrating it into the streetscape wherever possible. Planting, particularly of street trees, can help to soften the street scene while creating visual interest, improving microclimate (reducing wind and giving shade for example), and providing valuable habitats for wildlife; which is especially important in urban areas. Planting can also be used to create buffer zones, visual barriers, or landmarks and gateway features.

Where trees are to be used in a design, careful consideration must be given to the choice of species, their location and how they are planted. Ensuring sufficient un-compacted soil is available for newly planted trees is critical to ensuring the trees establish themselves successfully, thereby minimising maintenance and replacement costs.

Consideration should also be given to the potential effect of planting on roads, footways, SuDS and underground services; as tree roots can have a significant detrimental effect on carriageways, footways and highway drainage. However; this can be reduced with custom designed tree pits incorporating the use of root directing material and careful species choice, avoiding high water demanding species such as willow.

The tree and wider landscaping strategy should be considered alongside the design for other elements of street furniture which may be required in the public realm, such as street lighting, to ensure they are not in conflict.

Consideration also needs to be given to the long-term maintenance requirements for newly planted trees, LCC will not adopt liabilities and will expect adequate commuted sums for the future maintenance of highway tree planting and landscaping schemes.

The type and position of new trees will be agreed before the commencement of planting and will be approved under a Section 38 Agreement of the Highways Act 1980



Example use of root director material to prevent damage to the adjacent footway.

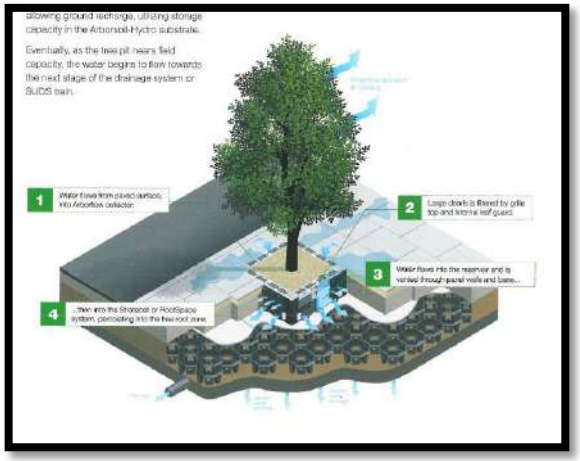
(Courtesy of GreenBlue Urban)

Reasons for planting trees

- Aesthetics – visual impact, screening unpleasant views;
- Trees can increase property prices, properties located in tree lined avenues show values increasing by 5-15%;
- Tree planting improves the liveability of urban areas;
- Storm water management and buffering– the crown of a large tree is a free standing anti-flood reservoir. One hundred mature trees would capture approx. 1,137,000 litres of rainwater per year, allowing some to evaporate, drawing some through the roots system and allowing the remainder to soak into the ground;
- For every 5% of tree cover in a community, storm water run-off is reduced by approximately 2%;
- Health – Trees have a positive impact on the incidence of skin cancer, asthma, hypertension and stress related illness by filtering out polluted air, reducing smog formation, providing shading from solar radiation and giving an attractive, calming setting for recreation;
- For every 10% increase in a cities tree canopy, Ozone is reduced by around 3-7%;
- Carbon reduction – trees are proven to absorb and store carbon. Planting trees is one of the most effective means of drawing excess CO2 from the atmosphere. A mature tree can absorb 21kg of carbon per year and release enough oxygen back into the atmosphere to support 2 humans;
- Biodiversity – natural habitats for birds and other fauna;
- Pollutant removal – trees will remove and store Sulphur dioxide, Nitrogen oxide, particulate pollution, Carbon monoxide, Cadmium, Lead and Nickel;
- Research has shown a 60% reduction in particulates from tree lined streets;
- Erosion reduction – reducing topsoil erosion through run-off and preventing harmful chemicals reaching water courses;
- Cooling effect – reducing temperatures by shading and transpiring water. This can help to reduce air conditioning bills and therefore energy use. One mature tree can produce the same effect as 10 room sized air conditioners. This becomes an effective tool in reducing the urban heat island effect;
- Trees can save up to 10% of local energy consumption through their moderation of the local climate;
- Noise reduction; and
- Wind speed reduction – buildings increase wind speeds and trees can significantly reduce wind speed up to a distance of 10 x their height.

Any proposed planting must meet the following criteria:

- When trees are to be planted, they should be 'the right trees in the right places'
  e.g. their dimensions in maturity fit the space available - narrow crowns on narrow verges, suited to soil type - lime loving maples on limestone & rural areas – locally characteristic - beech on The Wolds;
- A mixture of trees should be provided within the site to avoid monocultures and ensure a more robust tree population.
- Prior to adoption a single plan will be provided showing all existing planting, all proposed planting and all constraints (i.e. services, street lighting, road layout etc.);
- All trees to be planted within the highway will conform to BS8545:2014 Trees: from nursery to independence in the landscape;
- All new trees shall be planted in an appropriate “tree pit”;
- New trees shall not be planted in a manner so as to impede visibility when they are fully grown, consideration may be given to isolated thin trunked trees within visibility splays;
- Trees must not obstruct SuDS operation and/or illumination from street lighting;
- Planting of trees must avoid future encroachment of root systems along service routes;
- Where trees are planted within or adjacent to block paved areas then root directors shall be installed;
- Existing retained trees should have a form compatible with vehicular and pedestrian traffic within its influence;
- Trees should have a clear height of 5.5m between the road surface and the lowest branch. A 2.6m unrestricted clearance should be available over footway areas and 3.0m over cycleways;
- LCC will look favourably upon tree planting schemes which feature SuDS elements within its design, highway commuted sums may be reduced for innovative schemes providing SuDS benefits e.g. diverting excess surface water through root system.



Example use of the Arborflow system,

an innovative system for recycling surface water to irrigate tree pits

(Courtesy of GreenBlue Urban)

Street Lighting Design



Street lighting design of the adoptable highway shall be commensurate with British Standard BS5489 -1:2013 or any subsequent superseding code of practice. Designs are subject to approval by the HLLFA prior to acceptance. The HLLFA can provide a design service if required.

We encourage that developers discuss the street lighting provision required within the adoptable highway early in the process once an indicative layout design has been produced. Unless otherwise approved by the HLLFA, the street lighting within the public highway shall be permanently supplied by a distribution network operator (DNO) or an independent distribution network operator (IDNO) electrical supply.

Street lighting positions shall be determined by the requirements to meet the British Standard and any impediments to illumination levels, such as planned landscape and tree design shall be eliminated or minimised at the design stage.

The street lighting design must aim to minimise electrical energy usage whilst remaining compliant. Lighting must be specified to fit in with the HLLFA part night policy in which lighting on developments turns off at a pre-specified time during night time hours. The HLLFA is to be contacted for information on timings and any proposed exceptions.

Highway adoptable footpaths remote to the carriageway on developments may be considered as being exempt from lighting by the HLLFA. This will be individually assessed on each development proposal.

Any lighting on remote footpaths which cannot be accessed by a vehicle must have street lighting columns which can be lowered by a one-man operation without the aid of a vehicle.

All street lighting equipment must meet the required specification of the HLLFA.

Ideally street lighting columns on 30mph or less development roads shall be situated a minimum 0.8m from the carriageway edge and preferably behind a raised kerb.

On shared surface areas where a raised kerb is not available, extreme care must be taken within the design to ensure that the column is not clearly vulnerable to collision by travelling or parking vehicles.

Commuted sums may be required for a specification of street lighting equipment which exceeds the HLLFA requirement and would result in increased future maintenance costs.

Drainage

Designs should consider existing site drainage including flow paths and watercourses, and these should be incorporated into the layout wherever possible, including adequate provision for maintenance access.

Sustainable drainage principles should be incorporated in all developments as a requirement of both the planning process and the highway and SuDS adoption process. Surface water drainage infrastructure should be designed as an integral part of the highway system with the adopted approach of a "whole site" scheme design.

The provision of SuDS should be considered prior to fixing the total number of building plots and any plot locations. Good SuDS principles should be adopted by maximising the use of natural contours, topography and geology of the development site; and the benefits these can bring to the location, routing, layout and type of SuDS and highways infrastructure; together with considering dual use of areas such as open space and those set aside for amenity purposes.

Where it is necessary for rainwater from private residential property to drain to the highway drainage system, the HLLFA will consider accepting these flows as part of an integrated system. Retrofitting SuDS on new development sites is likely to result in poor solutions which are unlikely to be approved or adopted by the HLLFA. The HLLFA will require evidence that the sewerage undertakers have adopted surface and foul water sewers before it will adopt the roads and footways.

Unless otherwise indicated in this document, all new highway drainage systems must be designed in accordance with the appropriate guidance. These include Design Manual for Roads and Bridges (DMRB), Manual for Streets (MfS), Practice Guidance on Defra's Non Statutory Technical Standards for Sustainable Drainage and the *SuDS Manual (C753).

Key Benefits of SuDS

SuDS should be used to maximise the benefits and minimise the negative impacts of surface water run-off from developed areas. Managing rainwater discharges can: reduce damage from flooding, improve water quality, protect and improve the environment, protect health and safety, and ensure the stability and durability of drainage systems.

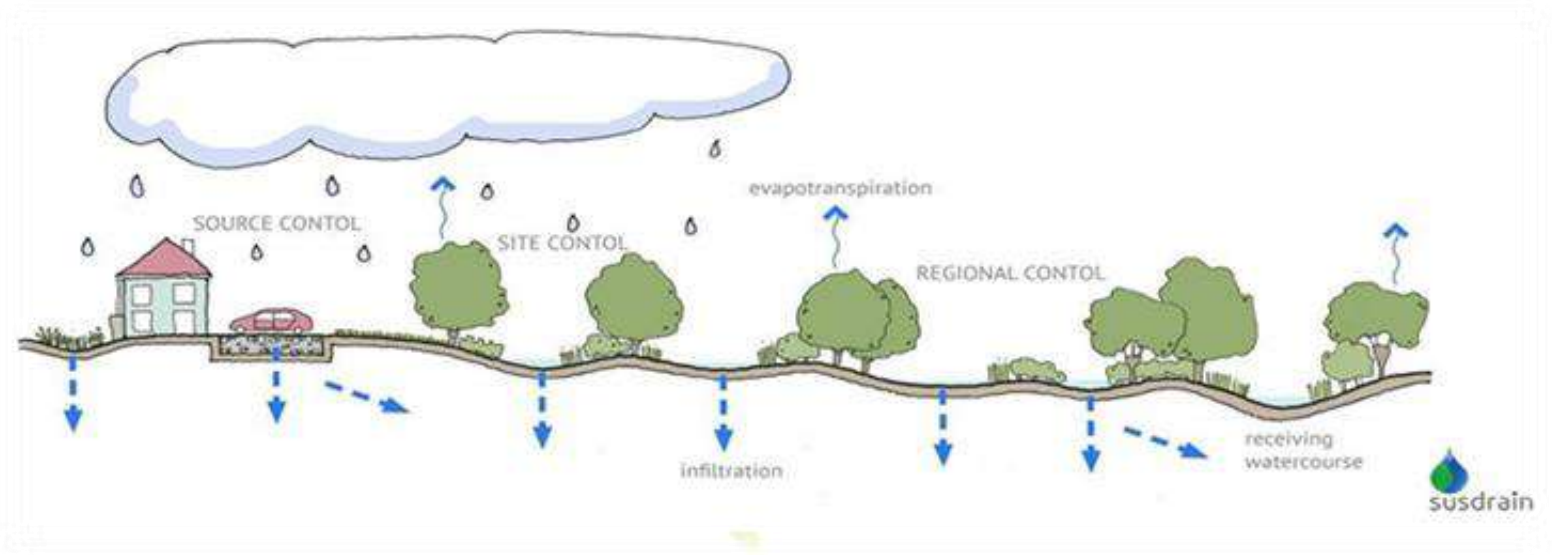
SuDS mimic the natural catchment processes to: reduce run-off, encourage natural groundwater recharge, reduce pollution, enhance amenity, and provide opportunities for increased biodiversity.

The National Planning Policy Framework (NPPF) expects SuDS to be considered where appropriate for all Major Developments. It is the responsibility of local planning authorities to consult the HLLFA on the management of surface water and using conditions and/or obligations, to deliver appropriate SuDS through the planning process. This includes securing clear arrangements for ongoing maintenance of SuDS assets for the lifetime of the development.

The Government Department for Food and Rural Affairs (DEFRA) produced non-statutory technical standards for SuDS in March 2015 for the design, maintenance and operation of SuDS and these should be adhered to.

Unless otherwise stated, and in conjunction with this Design Approach, the *SuDS Manual (C753) should be used to guide the assessment of sustainable drainage requirements for each development proposal.

The SuDS Management Train as shown below should be used in the general approach to SuDS design. Just as in a natural catchment, drainage techniques can be used in series to change the flow and quality characteristics of the runoff in stages. For further information refer to the Susdrain website.



Good SuDS Design Principles

The Local Authority SuDS Officer Organisation (LASOO) has produced Practice Guidance around the DEFRA non-statutory technical standards previously mentioned above, and indicate that a number of good design principles should be considered when assessing the SuDS requirements of development proposals. These are shown below:

Good SuDS Design Principles	
1	Any design proposal must consider the standards collectively.
2	Any drainage proposal must accommodate surface water flows from the entirety of the site, including both permeable and impermeable areas so as to not increase flood risk.
3	Any drainage proposal should aim to control the run-off volume to protect both the morphology and water quality of the receiving waters.
4	Any drainage proposal should aim to manage surface water within sub-catchments, close to source and at or near surface as reasonably practicable.
5	Any drainage proposal must consider overland flows onto the site.
6	Maintenance requirements, including provision for utilities and other services, must be considered during design to ensure continued operation of the drainage system.
7	Good design of the drainage system will assist in meeting the requirements for the provision of open space (as defined in the NPPF).
8	The design is cost-effective to operate and maintain over the design life of the development, in order to reduce the risk of the drainage system not functioning.
9	The design of the drainage systems must account for the likely impacts of climate change; and changes in impermeable area; over the design life of the development. Appropriate allowances are set out by the Environment Agency on the GOV.UK web site. See also CIRIA Factsheet – Applying Climate Change Allowances to SuDS Design. However; when referring to the Factsheet, the latest Government recommended allowances should be used.
10	The design of a drainage system must consider requirements for urban design that may be specified by the Local Planning Authority, particularly in relation to landscape, visual impacts, aesthetics, biodiversity and amenity.
11	Pre-application discussion should address these and other matters.
12	Surface water shall under no circumstances be discharged to a foul sewer.

Particular Challenges in the Fens

Much of Lincolnshire comprises flat low-lying fenland areas and can present some particular challenges to assessing SuDS requirements. These include:

- High groundwater table and low soil infiltration rates;
- Flat ground levels resulting in shallow flow gradients and shallow depths of pipes and underground structures to achieve a gravity outfall; and
- Taking account of typical IDB pump discharge rates of 1.4 l/s/Ha.

The Developer should have due regard to these, and other design challenges presented by different development sites in different locations across the County. See CIRIA Fact Sheet – Overcoming Common SuDS Challenges.



SuDS Design Run-off Destinations

Wherever possible, drainage systems should be designed to capture and re-use surface water (rainwater harvesting) to help reduce run-off volumes from the site and allow water, as a valuable resource, to be put to good use (e.g. irrigating landscapes, watering gardens, car washing and toilet flushing etc). In some instances when suitable water treatment is undertaken, surface water can be used for human and animal consumption. However; where re-use is not feasible (or is only part of the highway sustainable drainage solution); the NPPF Planning Practice Guidance indicates that generally, the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable:

1. Into the ground (i.e. infiltration but does not infer the use of soakaways!);
2. To a surface water body;
3. To a surface water sewer, highway drain, or another drainage system; or
4. To a combined sewer.

Particular types of sustainable drainage systems may not be practicable in all locations therefore developers should not assume that infiltration is always the solution as experience has shown that over 50% of developments require a positive outfall. Where possible, even before run-off destinations are decided, surface run-off should be used as a resource (rainwater harvesting) e.g. green roofs, water butts, grey water systems, and all be managed at source.

Design Criteria

The HLLFA's design criteria for highway SuDS and local flood risk comprise the National non-statutory SuDS Standards and local requirements as shown below:

Highway SuDS and Local Flood Risk Criteria	
1	**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.
2	**S2** - For greenfield developments, the peak run-off 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.
3	**S3** - For developments which were previously developed, the peak run-off 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.
4	**S4** - Where reasonably practicable, for greenfield development, the run-off 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 run-off volume for the same event.
5	**S5** - Where reasonably practicable, for developments which have been previously developed, the run-off 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 run-off volume for the same event, but should never exceed the run-off volume from the development site prior to redevelopment for that event.
6	**S6** - Where it is not reasonably practicable to constrain the volume of run-off to any drain, sewer or surface water body in accordance with **S4** or **S5** above, the run-off volume must be discharged at a rate that does not adversely affect flood risk.

7	**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.
8	**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.
9	**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.
10	**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.
11	**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.
12	**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. Note: the HLLFA will not consider adoption of pumping stations or rising mains.
13	**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.
14	**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.
15	In all surface water run-off, storage, conveyance, river flow and level calculations, the latest Government allowances are to be made for Climate Change. The HLLFA require either of the following approaches to be adopted: • Simple Approach – where the higher % uplift figure is used in all calculations; or • Detailed Approach – where the lower % uplift figure is used in all calculations and then detailed sensitivity tests are carried out and must demonstrate that there are no unacceptable flood risks either to the development site, or upstream or downstream of the site discharge location, by not allowing for the higher uplift figure. For more information see Applying climate change allowances to SuDS design.

16	Allowance to be made for a 10% increase (over the lifetime of the development) in impermeable area across the site being drained, often referred to as 'Urban Creep'.
17	Requirements for Water Quality (minimum two treatment stages before outfall) – 90% of rainfall events are less than 12mm, therefore, treat “first flush”/90% rainfall (generally 10mm – 15mm). (ref. to *Ciria Simple Index Approach)
18	Interception storage – prevent any runoff for rainfall events up to 5mm.
19	Systems must drain down within 48 hours.
20	ALL SuDS components should be designed to be fully functional for the lifetime of the Major or Minor Development (i.e.100 years). However, where specific asset replacement is required during this 100 year life to achieve this fully functional timeframe, this should be clearly stated (and costed), in the SuDS operation and maintenance plan.
21	Where several direct infiltration features are proposed within a single site, each “zone of drainage influence” must be considered e.g. where surface areas served by private soakaways are adjacent to surface areas served by HLLFA adopted SuDS features. For up to and including design rainfall and run-off conditions, private areas must not drain into HLLFA adopted drainage infrastructure.
22	Where infiltration trenches are proposed, the acceptable depth will be governed by several site-specific factors, including soil type and the ability to safely construct, inspect and maintain SuDS components (e.g. safely lay, wrap and maintain geotextile). Proportionate highway and SuDS construction and maintenance details are required by the HLLFA at Outline and Full planning stages. Safe and effective construction, maintenance and inspection methods should be clearly and fully thought through, and documented to inform the decision on acceptability of this type of drainage solution at the planning stage. We have produced a separate guidance document on Construction Management Plans and SuDS Method Statements which is available at https://www.lincolnshire.gov.uk/highways-planning/Guidance-for-developers/2.

Applying climate change allowances to SuDS design

Climate change allowances apply to ALL development. There are two different allowances to consider when designing surface water drainage on new developments i.e. A - Peak rainfall intensity (always required) and B - Peak river/watercourse flow (only required where the developed site discharges to a river or watercourse). These are explained below.

A. PEAK RAINFALL INTENSITY (millimetres per hour - mm/hr)

See Susdrain Fact Sheet - Applying climate change allowances to SuDS design
Please also refer to the latest approach and allowances provided by the EA.

Where a “Simple Approach” is used by the developer:

The 1:100y-6hr design storm peak rainfall intensity (mm/hr) used to calculate the peak run-off and where necessary, the peak storage volume required, should clearly show that a climate change allowance of +40% has been applied to the present day peak rainfall intensity & incorporated in the calculations.**NOTE:** If only the present-day rainfall intensity has been used in the calculation, and then the resulting storage volume has been factored by +40%, this will significantly under-predict the attenuation storage required and is unacceptable.

Where a “Detailed Approach” is used by the developer:

Initially, a minimum climate change allowance of +25% can be applied to the present-day peak rainfall intensity and incorporated in the peak run-off and peak storage volume calculations. However, sensitivity tests must demonstrate that there are no unacceptable flood risks by not allowing for +40% uplift (as in the “Simple Approach” described above). Sensitivity testing must demonstrate;

- no unacceptable risk to people, i.e. significant flood depths or velocities on site for sensitivity test rainfall that could present a danger to people;
- no unacceptable risk to property on site; and
- no additional flood risk generated elsewhere off site.

Where an unacceptable flood risk is demonstrated the +40% allowance must then be incorporated into design calculations for storage and conveyance.

The extent of sensitivity testing should be proportionate to the scale of development, sensitivity of the receptor and the severity of risk likely to be experienced in the event of the +25% uplift figure being exceeded. When attenuation storage fills to capacity any additional flows generated are either likely to pond at the storage location or be conveyed elsewhere.

B. PEAK RIVER/ WATERCOURSE FLOW (cubic metres per second - m3/sec)

To be considered ONLY if the developed site discharges to a river or watercourse.

In order that the design surface water discharge from the developed site can safely and effectively enter the receiving watercourse during high water levels and storm flows; a climate change allowance must be added to the "present day" peak river flow (m3/sec) to determine the design peak river/watercourse flow and subsequently the design peak river/watercourse water level.

Where a "Simple Approach" is used by the developer:

The 1:100y present day peak river flow (and subsequently calculated peak river level at the discharge point) should clearly show that the higher climate change allowance shown in the table above has been applied & incorporated in the calculations.

Where a "Detailed Approach" is used by the developer:

Initially, the lower climate change allowance can be applied to the present day peak river flow (and subsequently calculated peak river level at the discharge point), & incorporated in the calculations. However, sensitivity tests must demonstrate that there are no unacceptable flood risks either to or from the proposed development site, both upstream and downstream, by not allowing for the higher uplift (as in the "Simple Approach" described above).

Where an unacceptable flood risk is demonstrated the higher allowance must be incorporated into design calculations for storage, conveyance and discharge.

The extent of sensitivity testing should be proportionate to the scale of development, sensitivity of the receiving watercourse, and the severity of risk likely to be experienced on the development site, along with upstream and downstream areas, in the event of the lower uplift figure being exceeded. The sensitivity calculations should extend downstream from the discharge point for as far as is necessary, to show the point at which any increase in flow velocity and volume become negligible.

The climate change allowance to be used to understand the range of impacts, and to ensure the overall site drainage design complies with the Non-statutory SuDS Standards, depends on the Environment Agency Flood Zone category and the NPPF Vulnerability Classification of the proposed development type on the site, as shown below:

Vulnerability Classification	**Flood Zone 1** *Land with less than 1:1000 annual probability of flooding*	**Flood Zone 2** *Land between 1:100 & 1:1000 annual probability of flooding*	**Flood Zone 3a** *Land between 1:100 or greater annual probability of flooding*	**Flood Zone 3b** Land where water has to flow or be stored
Essential infrastructure *E.g. utility & transport*	+25%	+65%	+65%	+65%
Highly vulnerable *E.g. emergency services & basements*	+25%	+35% to +65%	Development not permitted	Development not permitted
More vulnerable *E.g. hospitals, residential, care homes & park homes*	+25%	+35% to +65%	+35% to +65%	Development not permitted
Less vulnerable *E.g. non-residential, shops, industry & commercial*	+25%	+25% to +35%	+25% to +35%	Development not permitted
Water compatible *E.g. amenity, docks & marinas*	+25%	+25%	+25%	+25%

Hydraulics

Hydraulic calculations must be submitted to support major planning applications and Section 38 submissions. Calculations should demonstrate the performance of the designed system for a range of return periods and storm durations inclusive of the 1 in 1 year, 1 in 2 year, 1 in 30 year and 1 in 100 year plus climate change return periods. Storm durations up to and including 6 hours are expected unless other Risk Management Authorities specify greater.

The system shall be designed so that no internal flooding occurs in the 100 year return period. Any flooding from the drainage system in this return period shall be routed and stored in designated flood storage areas away from any properties in a location which will cause minimal disturbance to the development. The temporary holding of flood water on major access roads is not permitted under any circumstance.

The proposed drainage design shall be simulated with both FSR and FEH rainfall data. Rainfall data shall be adjusted in accordance with the Government's latest climate change impact predictions. The rainfall data methodology with the greater impact on simulations shall be used; however both should be submitted for clarity. The greater impact may vary by storm duration and return period.

Industry recognised software may be used provided its input data and output files are compatible with Causeway Flow. Proprietary manufacturer/ supplier software may be used provided that their materials are intended to be used on the development and they have been approved, prior to design, by the HLLFA. When proprietary software is used the Highway and Flood Authority may request alternative calculations to confirm the outputs. If the developer opts to change material supplier on site the Highway and Flood Authority may request new calculations.

The Wallingford Procedure shall be used to design drainage systems up to and including 5 year storm return periods with durations up to and including 120 minutes.



No latent storage allowance shall be made within the hydraulic calculations (e.g. gully pots and laterals). In Microdrainage this is referred to as the MADD factor and must be set to zero.

Receiving Water Bodies

The developer should take into account the condition of a receiving water body or drain during the required storm stimulations. Should the outfall be submerged or impeded in any way then the developer will be required to undertake further simulations of the highway drainage system under such conditions.

Where discharge is proposed to a riparian watercourse the developer should demonstrate that it is fit for purpose by providing a report detailing the condition of the bed, banks and structures to ensure there is no impediment to flow until it discharges into a publicly maintained network.

SuDS Considered for Adoption by the HLLFA

The HLLFA will consider adopting SuDS that are necessary to drain the highway and are integral to it (i.e. not off-line).

Not all SuDS types shown in the SuDS Manual are suitable for this purpose. Therefore, the HLLFA will generally only consider adopting:

- Filter drains and infiltration trenches;
- Grass filter strips;
- Pervious pavements; and
- Swales and surface water flow conveyance features.

We recommend that developers seek early engagement with the HLLFA if they propose any other SuDS types for potential adoption.

Specific design requirements for each of these SuDS types are shown on page 40. See also *Appendix B of the updated SuDS Manual (C753), which includes helpful checklists for the planning and design of SuDS components.

The adoptable highway drainage design for the development should be designed to cope with run off from highway areas, including: roads, footways, access crossings, lay-bys and verges to be adopted by the HLLFA. For these areas, an impermeability of 100% shall be assumed. No other areas should drain directly or indirectly to the highway infrastructure to be adopted. Where private property falls towards the adoptable highway, sustainable drainage shall be constructed on the driveway to intercept any runoff and feed it into the domestic surface water drainage system (e.g. bio-retention/filtration systems, soakaways, rainwater gardens, ponds and wetlands).

Requirements for the assessment, testing and design of infiltration SuDS solutions

Infiltration of surface water into the ground as a SuDS solution should only be considered where the underlying ground conditions are shown to have capacity and be appropriate, otherwise the proposed infiltrating drainage system will not function as intended for the lifetime of the development.

All proposed infiltration drainage systems should be assessed, tested and designed in accordance with *Chapters 13, 20, 24 and 25, and *Appendix B4 of the updated SuDS Manual (C753). The HLLFA will refer to *Table B.6 Infiltration assessment checklist, contained within the SuDS Manual (C753) when considering the acceptability of the proposed SuDS infiltration system.

Specific key requirements to note include:

- All infiltration SuDS solutions shall have regard to the HLLFA flood and drainage criteria for highways and SuDS.
- Transparency of design (including infiltration rates, safety factors, soil/materials porosity, inflows and outflows etc.) of individual SuDS components comprising the proposed infiltration systems within the SuDS management train will be required;
- Infiltration tests shall be carried out in accordance with the Bettess Report (1996) Infiltration drainage – manual of good practice CIRIA R156, which is based on the design approach in BRE 365 (1991);
- Test pits are to be filled three times and the worst-case infiltration rate resulting is to be used when applying the appropriate factor of safety (as shown in *Table 25.2 CIRIA SuDS Manual), for calculating the required design capacity for infiltration storage;
- The likely impact on the infiltration material, soil and underlying strata, and the long-term infiltration rates should be assessed;
- Infiltration tests should be carried out at the location, depth and head of water that replicates the proposed infiltration design (please take into consideration proposed finished ground levels);
- Where, in some cases, the developer feels it's not possible to carry out infiltration tests in trial pits, due to depth and access constraints etc., Lincs Lab will not accept tests carried out in boreholes in accordance with BS EN ISO 22282-2:12. This is because infiltration testing in a borehole does not replicate the conditions for a pervious pavement or swale, and basing the design on the infiltration rate from a borehole test could lead to a design solution that isn't appropriate. If necessary, seek further advice from Lincs Lab; and
- Where, over the lifetime of the development, the potential ingress of silt could adversely affect the overall performance of the infiltration system, a monitoring well may be required by the HLLFA, to monitor the drop in water level after heavy rain.

Consideration of groundwater levels

It is important to ensure that groundwater levels are well below the proposed SuDS features. If the ground water level begins to encroach into the bottom of the SuDS features this will be using the storage volume intended for surface water storage.

For effective infiltration, soils must be permeable and unsaturated. Where total infiltration is the sole method of surface water disposal, there shall be a minimum of 1m* depth between the underside of the lowest SuDS structure and the highest recorded ground water level. Where possible, a minimum of twelve months seasonable, recently recorded evidence of relevant groundwater levels is required. However; where this is not available, the precautionary principle will prevail, and equivalent other data and evidence is required by the HLLFA.

*Where a total infiltration method of SuDS cannot be achieved due to the presence of high groundwater levels preventing the minimum 1m criteria above, the acceptability of the SuDS solution proposed shall be dependent on detailed supporting evidence (e.g. soil permeability, hydraulic calculations, groundwater levels etc.) provided to the HLLFA.

With specific regard to the construction of SuDS and the materials used, all work should be carried out in accordance with the HLLFA Development Roads and Sustainable Drainage Specification and Construction.

Connections to existing drains or public sewers

Should a developer wish to drain any part of a proposed development to an existing highway drainage system, they will be required to submit a full survey of the existing system together with calculations which adequately demonstrate its hydraulic and structural suitability to accept additional flows. Should it become necessary to improve the existing highway drainage system within the existing public highway it shall be delivered under Section 278 of Highways Act 1980 by Agreement with the HLLFA.

The developer should be aware that particular conditions may be imposed for connections to brick sewers, large diameter sewers or where adverse conditions make construction of a manhole difficult. The Undertaker or HLLFA may elect to make the connection at the developer's expense. This should be taken into account when designing the system. In general, the connection into an existing highway drainage system will require the construction of a new manhole.

Easements

All highway drainage systems shall be situated within land which is to be adopted by the HLLFA; the only exception being where the development is to drain to a remote outfall away from the development. In this instance, where the final outfall pipe leaves the development, it may by agreement cross third party land and will be subject to the required wayleaves/easements and consents which will need to be provided to the HLLFA in the form of a Deed of Easement.

Only in exceptional circumstances will elements of the highway drainage system be permitted with an area of public open space, subject to the written approval of the LPA. Where such circumstances do arise, the developer/ landowner will be required to provide a Grant of Easement giving the HLLFA right of access at all times for maintenance purposes.

Developers shall seek the advice of the HLLFA if the easement is to be landscaped as there may be restrictions on the layout and species permitted.

There shall be no physical obstructions or structures on, above or below the easement route with the exception of minor services and simple fencing that may cross the route perpendicularly.

Minimum easement widths are shown below. Where other pipe layouts are proposed (e.g. filter drains) then advice must be sought from the HLLFA.

Minimum distances of buildings and structures from prospective highway drains

Sewer Diameter	Up to 449mm	450mm – 749mm	750mm – 924mm	925mm and above	Box Culverts the greater of
Depth to invert <3m	3.0m	3.5m	4.0m	5.0m	4.0m or 2m from the outside edge
Depth to invert >3m	Seek advice	Seek advice	Seek advice	Seek advice	Seek advice

Note 1: Distance shall be taken as centreline of pipe unless otherwise stated

SuDS Components and Indicative SuDS adopting authority

For further guidance on possible adoption of SuDS infrastructure, please contact the relevant Authority.

SuDS Components		HLLFA	Water & Sewerage Company	Internal Drainage Board	Man. Company	Riparian Owner
Pervious Pavements	Surfaces that allow inflow of rainwater into the underlying construction or soil.	Yes*	No	No	Yes	No
Green Roofs	Surfaces that allow inflow of rainwater into the underlying construction or soil.	No	No	No	Yes	Yes
Filter Drains, Infiltration Trenches and Filters	Linear drains consisting of trenches filled with a permeable material, often with a perforated pipe in the base of the trench to assist drainage, to store and conduct water; they may also permit infiltration. Engineered sand filters designed to remove pollutants from runoff.	Yes*	Yes**	No	Yes	No
Filter Strips	Vegetated areas of gently sloping ground designed to drain water evenly off impermeable areas and to filter out silt and other particulates.	Yes*	Yes**	Potentially	Yes	No
Swales and Flow Conveyance	Shallow vegetated channels that conduct and retain water, and may also permit infiltration; the vegetation filters particulate matter.	Yes*	Yes**	Potentially	Yes	No
Basins, Ponds and Wetlands	Areas that may be utilised for surface runoff storage.	No	Yes**	Potentially	Yes	No
	Sub-surface structures to promote the infiltration of surface water to ground. They can be trenches, basins or soakaways.	No	Yes**	No	Yes	No
Bio-Retention Areas	Vegetated areas designed to collect and treat water before discharge via a piped system or infiltration to the ground.	No	Yes**	Potentially	Yes	No
Surface Channels and Rills	Hard engineered surface flow conveyance structures	Yes*	Potentially	Potentially	Yes	No
Pipes and Accessories	A series of conduits and their accessories normally laid underground that convey surface water to a suitable location for treatment and/or disposal. (Although sustainable, these techniques should be considered where the use of other SUDS techniques is not practicable.)	Yes*	Yes**	No	Yes	No

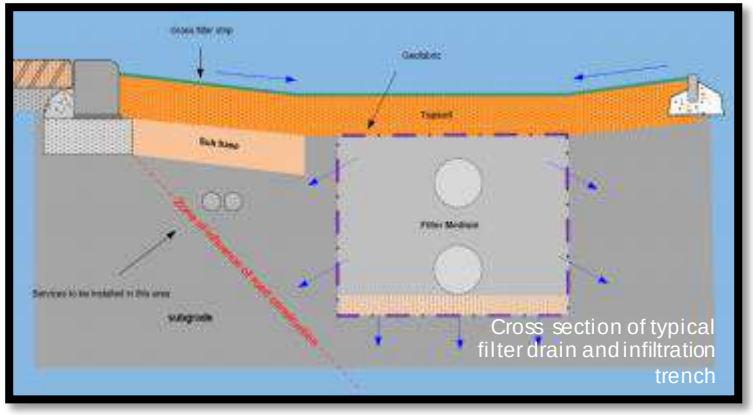
* Only if required to drain the highway and are adjacent to, or visually part of, and integral to the highway system. May accept rainwater from residential properties where needed. Not considered 'off line' components.

** Only if private water enters the system and SuDS train elements are continuous. Will accept highway water if needed.

Filter Drains & Infiltration Trenches



SuDS Manual (C753) Chapter 16: Filter Drains (Exeter Fields, Stamford)

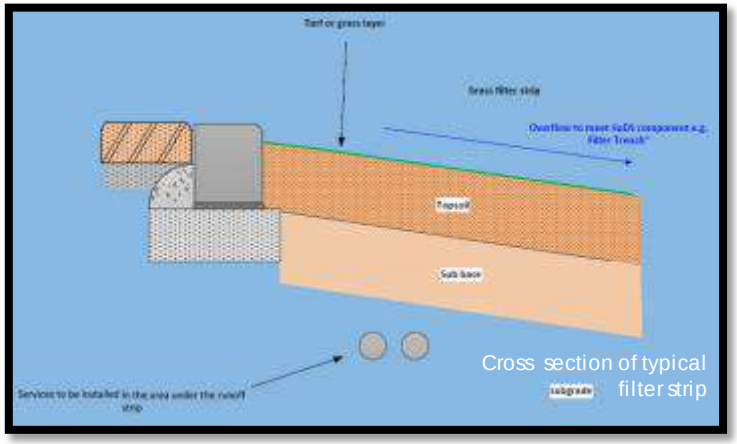


Cross section of typical filter drain and infiltration trench

SuDS Elements	Design Requirements
1. Depth of trench*	Between 1.0 – 2.0m & min 600mm below highway formation level
2. Width of trench	Between 450 - 900mm
3. Minimum width of grass filter strip	1.0m
4. Maximum longitudinal slopes	2%
5. Minimum distance from structural foundations	5.0m
6. Minimum distance from a carriageway	Situated outside the load line or 1m from the carriageway (whichever is greater)

*The acceptable depth of infiltration trenches will be governed by several site-specific factors, including soil type and the ability to safely construct, inspect and maintain SuDS components (e.g. safely lay, wrap and maintain geotextile etc). Proportionate highway and SuDS construction and maintenance details are required by the HLLFA at Outline and Full planning stages. Safe and effective construction, maintenance and inspection methods should be clearly, and fully thought through by the developer, and documented to inform the HLLFA decision on acceptability (at the planning stage), of this type of drainage solution for the specific site under consideration.

Grass Filter Strips



Cross section of typical filter strip

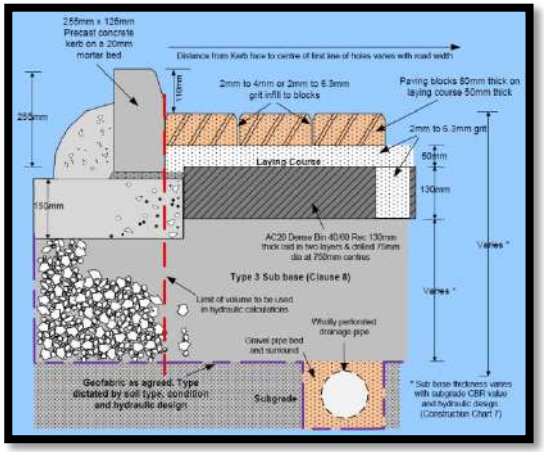


SuDS Manual (C753) Chapter 15: Filter Strips (Kyme Road, Heckington).

Suitable for all road types.

SuDS Elements	Design Requirements
1. Maximum flow depth	100mm
2. Minimum width of grass filter strip	1.0m
3. Length of filter strips	0.5 – 3.0m
4. Longitudinal slopes	Between 1 - 5%

Pervious Pavements



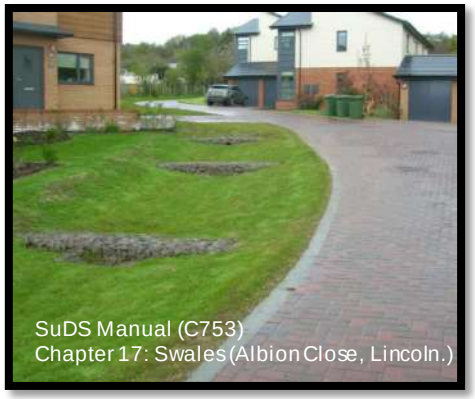


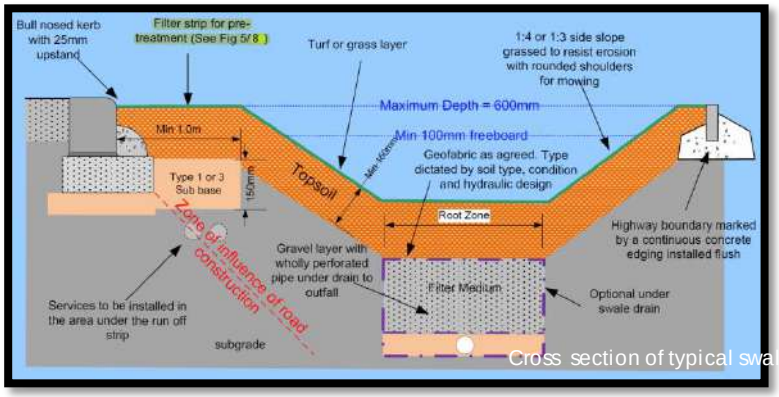
Pervious pavements can be considered in SUDs design where there is suitable infiltration and the groundwater level is low enough.

General considerations for use include:

- Suitable for minor access road and shared surface road (ramp).
- A 40y design life is required for adoptable pervious paving so as to be compatible with other road constructions.
- Service trenches are acceptable under pervious pavements, but they should be located at dedicated crossing points and be clearly marked with a different pattern/shade/colour of blocks.

SuDS Elements	Design Requirements
1. Surface layer permeability	>5000mm/h
2. Maximum groundwater level	At least 1m below infiltration flow outlet
3. Minimum CBR value	3%





Suitable for all road types. Swales with infiltration must generally be a minimum of 5m from buildings (except for a permeable pavement that does not take any extra impermeable catchment such as a roof). Where they are less than 5m, the assessment should be app roved by a suitably qualified professional such as a registered ground engineering advisor (See updated *SuDS Manual (C753): Chapter 25 Infiltration and Susdrain Fact Sheet: Using SuDS close to buildings.

SuDS Elements	Design Requirements
1. Depth of swale	200 - 600mm
2. Base width of swale	0.50 - 2.0m
3. Side slopes of swale	25 - 33%
4. Longitudinal bed slope of swale	0.5 - 6%
5. Minimum longitudinal length of swale	5.0m
6.Minimum distance from structural foundations	5.0m

Traditional Positive Drainage Systems

Spacing of gullies shall be determined on the basis of one gully per 180m^2 impervious area to be drained, including footways, access crossings, lay-bys and verges. Run off from footways and cycleways separated from the carriageway should be intercepted and directed into the highway drainage system – run off should not flow onto private property.

Gullies should be sited carefully and not where traffic would be prevented from passing the maintenance gully tanker or within the dropped kerb zone of formal pedestrian crossing points. Every formal pedestrian crossing point should have a gully position on the upstream side of the crossing on streets with traditional positive drainage. Double gullies must always be provided at low points and each must have its individual connection to the receiving asset. Additional gullies should be located at the upstream tangent point of road junctions to prevent water flowing across the junction mouth. Spacing of gullies on the approached to superelevated carriageway needs careful consideration so as to prevent cross carriageway flows. Care should be taken to avoid ponding in the transition length when the longitudinal gradient is flat or where there are assets such as traffic islands or central reserves.

Gully laterals should not exceed 12m in length.

Linear and combined kerb drainage systems are only permitted with prior approval from the HLLFA.

Additional Detailed Design Considerations

Developers should refer to Development Roads and Sustainable Drainage Specification and Construction for detailed design and construction specification for adoptable infrastructure.

To assist in the detailed design during planning stage, the developer should give due consideration to the following;

- Manholes, catchpits and sewers should be sited with due regard to public utility services. A manhole or catchpit should be built at every change of alignment or gradient; at the head of all pipe runs; at every junction of two or more pipes (other than gully connections); wherever there is a change in the size of pipe. Manholes should be located no further than 100m apart and catchpits should be located no further than 90m apart.
- Pipes within the highway shall sit within an envelope projected 1.0m off each kerb line. The most outer face of chambers shall sit within an envelope of 0.5m, ideally 1.2m, off each kerb face.

- Water retaining structures using geocellular modular units are not permitted beneath the adoptable highway. Where they are used as a component approval shall be obtained from the HLLFA.
- Where pipe lengths are located outside the adoptable public highway, manholes and ancillary structures shall be accessible by conventional sewer cleaning equipment (e.g. large combination jetting/ vacuum unit).
- In sealed networks the maximum water level for a 1 in 30 year return period shall not be greater than 300mm below cover level.
- In open drainage assets the freeboard stated in the standard details shall not be exceeded in a 1 in 30 year return period.
- The minimum size of highway drains to be adopted is 150mm nominal internal diameter.
- The roughness value (ks) for pipeline design should be 0.6mm. Manning's n shall be used for the roughness coefficient in SuDS design.
- The minimum pipe velocity shall be 1.0m/sec at pipe full flow for the design storm. Where the HLLFA approves oversized pipes for the storage of highway water run off the minimum proportional velocity shall be 1.0m/sec for the design storm flow – the developer must supply the calculations to the HLLFA.
- Highway drains laid within the adoptable carriageway shall have a minimum of 1.2m cover. This is to be measured from the top of the pipe barrel to the finished road surface. Where this isn't achievable, the pipe will be subject to special protective measures (detailed further in Development Roads and Sustainable Drainage Specification and Construction). No perforated pipes within SuDS installations shall be at a shallower depth subject to appropriate calculations.
- Pipes situated within non-trafficked (vehicular) areas shall have a minimal cover of 0.9m. Where this is not achievable, the pipe will be subject to special protective measures as above.
- Pipes/ conduits greater than 600mm diameter are classed as highways structures; please refer to Small Highways Structures Design Guide.

Assessing Flood Risk

National Planning Policy

The National Planning Policy Framework (NPPF) Footnotes 50 and 51 state:

(50) A site-specific flood risk assessment should be provided for all development in Flood Zones 2 and 3. In Flood Zone 1, an assessment should accompany all proposals involving: sites of 1 hectare or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in future; or ***land that may be subject to other sources of flooding****, where its development would introduce a more vulnerable use.*

(51) This includes householder development, small non-residential extensions (with a footprint of less than 250m2) and changes of use; except for changes of use to a caravan, camping or chalet site, or to a mobile home or park home site, where the sequential and exception tests should be applied as appropriate.

(Refer to Paragraphs 148 to 169)

HLLFA Interpretation of the National Planning Policy

The HLLFA will make an appropriate response to planning applications depending on whether Major or Minor Development is proposed. (i.e. Major Development being 10 dwellings or more; or equivalent non-residential or mixed development, or 1 Ha and above; and Minor Development being less than 10 dwellings, or equivalent non-residential or mixed development, or below 1 Ha). Where a development is below 1Ha but has more than 10 dwellings, the HLLFA will class this as Major Development.

The HLLFA considers the term "land that may be subject to other forms of flooding", to include where the proposed development or change of use is located in an area shown to be at risk of local flooding (i.e. surface water, groundwater and from ordinary watercourses) using the evidence below:

Surface Water Flood Risk	Identified within a 1:100year flood probability on the EA Surface Water Flood Map (viewed using EA website).
Groundwater Flood Risk	British Geological Survey (BGS) website showing Susceptibility to Groundwater Flooding, and the Joint Lincolnshire Flood Risk and Drainage Management Strategy, Part 2B of 3: Annexes A-F) (viewed using LCC website).
Ordinary Watercourse Flood Risk	Within 10m (measured horizontally of the light blue line depicting an ordinary watercourse up stream of the EA Main River extent as shown on the Main River Consultation Map (viewed using EA website).
Historic Flooding	Previously flooded as indicated on LCCs recorded Section 19 Flood Investigations (viewed using LCC website) or where evidence of other historic flooding exists.

A FRA or FRS considering local sources of flood risk should be provided at the earliest possible stage in the planning and adoption process, and in accordance with;

Flood Risk Assessment (FRA)	Where **"Major Development"** is proposed in a flood risk area.
Flood Risk Statement (FRS)	Where **"Minor Development"** is proposed in a flood risk area.

Contents and Details of a Local Sources FRA and FRS

The content and detail necessary will vary for each development or change of use proposal. However, it should be evidenced based, and the information provided should be appropriate to the size and complexity of the proposed development.

As an indication, FRAs should include:

- An assessment of flood risk should describe and quantify flood risk to and from the proposed development in detail, including downstream impacts on receiving watercourses;
- Detail any measures proposed to effectively manage and mitigate direct and residual flood risks; and
- Ensure that the development will be safe for its lifetime taking climate change into account.

Information on "What is a Flood Risk Assessment" and the type of detail needed within one, is shown in the NPPF Planning Practice Guidance Para 30.

Whilst a FRS may be less detailed than an Assessment, it has the same overall objectives as outlined in the above referenced document. It should also follow the same overall principles mentioned above and provide evidence that key flood risk factors have been considered. Where they are necessary, flood risk mitigation measures should be proposed to ensure that the development will be safe for its lifetime, taking climate change into account.

Flood Risks from "Non" Local Sources

For further information on flood risk assessments relating to fluvial and coastal flood risks please visit the Environment Agency website.

Integrated Approach to a FRA and FRS

Where flood risks to a particular site include both local and non-local sources, the FRA and the FRS should take account of all sources of flood risk, and any mitigation measures required, together in the one document. The interaction and combined impacts should be considered and taken account of. In particular, flood risk and drainage impact downstream, including on the capacity of receiving watercourses to safely carry flows from the development site, are essential elements of the FRA and FRS. Hydraulic studies of downstream impacts and necessary mitigation measures should extend for as far as is necessary to show the point at which any increase in flow velocity and volume become negligible.

Developers should be wary of locating housing at low spots, as floodwater will always tend to accumulate there. If unavoidable, special care should be taken to ensure that property is protected by raising threshold levels, and/or providing additional drainage etc. (For further information refer to the Government publication Improving the Flood Performance of New Buildings: flood resilient construction (2007).

Flow Exceedance Routes

Flood exceedance routing plans should clearly indicate the flood flow direction, depth and velocity across the whole development site. The flow paths need to be generated by a computer software by integrating all proposed and (where applicable) existing drainage assets with the proposed finished ground and floor levels of the development. Artificial and natural obstructions must be considered in the simulation. Alternately, the developer may submit a computer generated model to be interrogated by the HLLFA.

It is expected that flood flow paths generated within the development will be contained within the site curtilage. In unusual circumstances where flow paths go beyond the development boundary the developer must demonstrate that they will not cause nuisance to surrounding property.

No flood flow depth should exceed 100mm in depth or 3.0m/s velocity.

Assessing Transport Requirements

Approach

The HLLFA will review development proposals in accordance with National Planning Policy Guidance. Developments which generate significant amounts of movements should be supported by a Transport Assessment.

- Opportunities for sustainable modes should be taken up;
- Safe and suitable access for all should be achieved; and
- The residual cumulative impact of the development should not be severe.

Guidance for where Transport Assessments may be required

Transport Assessments will be required for all large developments, typically:

- 80 or more dwellings;
- 1000 sq. m. and above GFA retail;
- 2500 sq. m. and above GFA office;
- 5000 sq. m. and above GFA industry; and
- 10000 sq. m. and above GFA warehousing.

Other development uses need to be considered on an individual basis. Smaller developments which generate less traffic, still need to demonstrate that National Planning Policy Framework (NPPF) transport objectives have been achieved and a Transport Statement may be required.

Scope of a Transport Assessment

The detailed scope of a Transport Assessment should be discussed and agreed with the HLLFA Development Management Officer, prior to preparation and submission in support of a development proposal. In principle Transport Assessments and Statements should:

- Be proportionate to the size and scope of the proposed development to which they relate and build on existing information whe rever possible;
- Be established at the earliest possible practicable stage of a development proposal;
- Be tailored to particular local circumstances, (other locally determined factors and information may need to be considered in these studies provided there is robust evidence for doing so locally);
- Be brought forward through collaborative ongoing working between the Local Planning Authority/Transport Authority, transport operators, Rail Network Operators, Highways England (where there may be implications for the strategic road network) and other relevant bodies; and
- Refer to, and where necessary, use output from existing transport models which the HLLFA maintain and operate for the larger urban centres in the County.

Transport Assessments and Transport Statements should primarily focus on evaluating the potential transport impacts of a development proposal. They may consider those impacts net of any reductions likely to arise from the implementation of a Travel Plan, though producing a Travel Plan is not always required. The Transport Assessment or Transport Statement may propose mitigation measures where these are necessary to avoid unacceptable or “severe” impacts. Travel Plans can play an effective role in taking forward those mitigation measures which relate to on-going occupation and operation of the development.



Standard Contents of a Transport Assessment

The required contents of a Transport Assessment are shown below:

Standard Contents of a Transport Assessment	
1	Introduction.
2	Existing conditions.
3	Proposed development.
4	Modal choice and trip generation (separate Travel Plan if necessary).
5	Trip distribution and assignment.
6	Assessment years.
7	Traffic impact – junction and network assessment.
8	Pedestrian accessibility.
9	Bicycle accessibility.
10	Public Transport accessibility.
11	Road safety.
12	Parking, servicing and layout arrangements.
13	Conclusions.

Travel Plans

Long term Management Strategy

A Travel Plan is a long-term management strategy for an existing or proposed development that seeks to integrate proposals for increasing sustainable travel by the future occupier(s) into the planning process; and is articulated in a document that is to be regularly reviewed by the future occupier(s) of the site. It is based on evidence in the transport assessment of the anticipated transport impacts of the proposal and involves the development of agreed and specific outcomes; linked to an appropriate package of measures aimed at encouraging sustainable travel.

The current Lincolnshire Local Transport Plan and Central Lincolnshire Local Plan also focus on the importance and requirements of travel planning.

Lincolnshire County Council's Guidance Notes for the preparation and implementation of Development Travel Plans explains in detail the various travel plans and the process, and provides guidance to writing a plan along with a toolkit of measures that developers can consider.

Links for Reference

National Policy Planning Framework:

http://planningguidance.communities.gov.uk/blog/guidance/travel-plans-transport-assessments-and-statements-in-decision-taking/travel-plans/

LCC Guidance:

https://www.lincolnshire.gov.uk/downloads/file/1946/travel-plan-guidance-pdfa



Mobility Hubs

It may be necessary on large developments to implement mobility hubs. Mobility hubs are recognisable, focal places which aggregate modal facilities to encourage interchange between different transport modes and provide more choice and alternatives to how residents, employees and visitors travel.

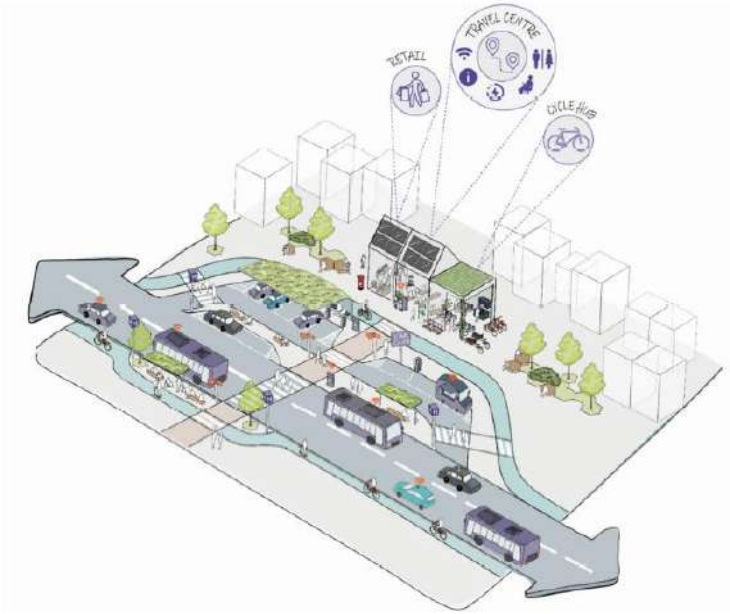
Mobility hubs can offer a range of commercial, community and mobility services and act as a focus for local community and economic activity. They will generally house facilities such as a bus shuttle to the nearest town or city centre, local bus services, flexible demand responsive travel, electric vehicle charging, long and short term cycle parking provision, cycle hire facilities, delivery lockers and more.

Hubs will be located at key points that are accessible and available to all, and will provide links to key local facilities such as retail, education or healthcare. On larger sites it may be necessary to develop a primary or core hub which is supported by smaller, secondary hubs.

Primary or Core Hubs will contain all the components as the main hub location within the site.

Secondary Hubs will contain fewer components, but these will be tailored to the location. For example, they could be focussed around bus stops, cycle hire facilities or shuttle bus services.

Mobility points will be located elsewhere in the site, which are much smaller locations likely to be based around bus stops that provide further travel information and a limited number of facilities.



Parking Provision

Cycle Parking

The provision of convenient secure parking and related facilities are fundamental to attracting modal shift to cycling, particularly from single occupancy motorised journeys made over shorter distances on a regular basis, such as commuting and utility journeys.

For this to be effective, cyclists must know that there will be adequate cycle parking provision at their origins, destinations and interchanges with other transport modes.

Cycle parking should consider the needs of all potential users and the range of cycles which will use the facilities. The provision of other services such as maintenance facilities will also improve the experience for users and deter cycle theft.

A cycle hub can be used where cycle parking is required in great numbers, generally within a building, and often co-located with maintenance facilities, cycle hire, changing rooms, lockers and showers. Cycle hubs may be restricted to key or pass holders, or general access.

On-street cycle parking can be positioned within build outs to protect car parking and reduce traffic speeds. Build outs should have a tapered approach to reduce the risk of cyclists moving suddenly into the path of following vehicles.

On residential sites, consideration should be given to cycle parking provision for flats and dwellings without garages or street access to rear gardens.

For commercial/ employment sites, cycle parking should be provided for both employees and visitors/customers.

In general cycle parking should be:

- In a secure, easily accessible position regularly overlooked by passers-by or staff;
- Convenient;
- Pleasant;
- Well signed and lit;
- Ideally under cover; and
- Positioned so as not to present a hazard to pedestrians, particularly those with impaired vision.

The exact number of cycle parking spaces will depend on the individual characteristics of the site and its surrounding area; however the table below can be used as an indicative guide.

Number of stands required:

TYPE OF DEVELOPMENT	
Food Retail	1 stand per 250 m^2 ground floor area (gfa).
Non - Food Retail	1 stand per 500 m^2 gfa.
Offices	1 stand per 200 m^2 gfa.
General Industry	1 stand per 200 m^2 gfa.
Warehousing	1 stand per 1000 m^2 gfa.
Cinema/ Theatres/ Conference Facilities/Other Places of Assembly with Fixed Seating	1 stand per 20 seats.
Schools, Sixth Forms and Colleges	1 stand for every 10 pupils 1 stand for every 10 staff

For further information, please refer to Local Transport Note 1/20.

Car Parking

Careful consideration should be given to parking provision when planning a development. When designing streets that are to be attractive, safe and friendly, parking will normally have a strong degree of success. An over provision can result in poor design, wasted space and an apparent encouragement to use cars in preference to walking, cycling, and public transport. The implications of having too little provision can have serious effects on highway safety as a result of on street parking.

Whilst sustainable modes of travel should be promoted, it should also be recognised that the offering of good bus services and cycle routes does not necessarily mean that car ownership levels will be reduced. It is not unusual that those that choose to travel sustainably for a large proportion of their journeys, will also own motor vehicles, for which parking provision should be provided.

Most car owners like to be able to see their vehicles and to know that they are securely parked. Rear parking courts are often under-utilised when poorly designed and provided in areas without on-street controls to maximise their use, and often lead to serious on-street problems.

Issues Caused by Inadequate Parking Provision

Pavement parking can lead to:

- Obstruction of driveways and accesses;
- Hindered access to service and emergency vehicles;
- Damage to soft landscaping, SuDS and footways;
- Cluttered, unsightly streets; and
- Neighbour disputes.

Otherwise well-designed neighbourhoods are often compromised in terms of their appearance and enjoyment, by ill-considered approaches to the provision of parking for residents and their visitors.

Parking spaces within streets and accessed directly from them, minimise the amount of land given over to accesses and manoeuvring areas. If cleverly positioned they can help to restrain speeds, as well as reducing the likelihood of indiscriminate and obstructive parking.

When creating shared space streets, on-street parking can be formal or informal. Squares and other spaces are particularly good for parking in the wider context of the sense of place, particularly when accompanied by strong landscaping to ensure that it does not dominate the street scene. Visitor parking should also be considered.

Developers should also refer to the relevant adopted Local Plan for LPA parking recommendations and requirements.

Garages

Garages should only be considered as parking provision when they are of a size that will accommodate general storage (such as lawn mowers, hedge trimmers, ladders etc.) and have garage doors that are wide enough to accommodate the modern car.

The minimum length of any driveway fronting a domestic garage should be 6 metres, where an up and over type garage door is provided. If a vertically open door (roller type) is to be provided, the length of the driveway may be reduced to 5 metres.

Service Vehicles and Essential Operational Parking

The servicing requirements of a proposal will vary considerably depending upon the type and size of development. Applicants will be required to demonstrate that any development proposals include adequate provision on site to allow for loading, unloading and turning of service vehicles without endangering road safety.

Provision for Motorised Two-Wheeler Parking

Parking for powered two wheels should be provided at 1 space per 20 parking spaces. Secure anchor points to which the machines may be locked should be provided.

In general, parking for Powered two wheelers should be:



- Flat, level and firm to prevent stands sinking into the ground;
- In a secure position regularly overlooked by staff or passers-by;
- As near to the entrance as the site layout permits;
- Well signed and lit;
- Ideally under cover, but if this is not possible, clear of trees;
- Positioned as to not present a hazard to pedestrians, particularly those with impaired vision; and
- Designed to ensure that they are not used by cars or other vehicles.

In addition, at larger sites, additional needs of employees who used powered two wheelers should be provided, such as lockers and changing facilities.

Disability Parking

Under the Disability Discrimination Act 2005, it is the responsibility of site occupiers to ensure that adequate provision is made for the needs of people with disabilities. The number of spaces required for people with disabilities varies between use classes, and the standard has been based on the DfTs Traffic Advisory Leaflet 5/95: 'Parking for Disabled People'.

The recommended proportions of spaces for Blue Badge holders are:

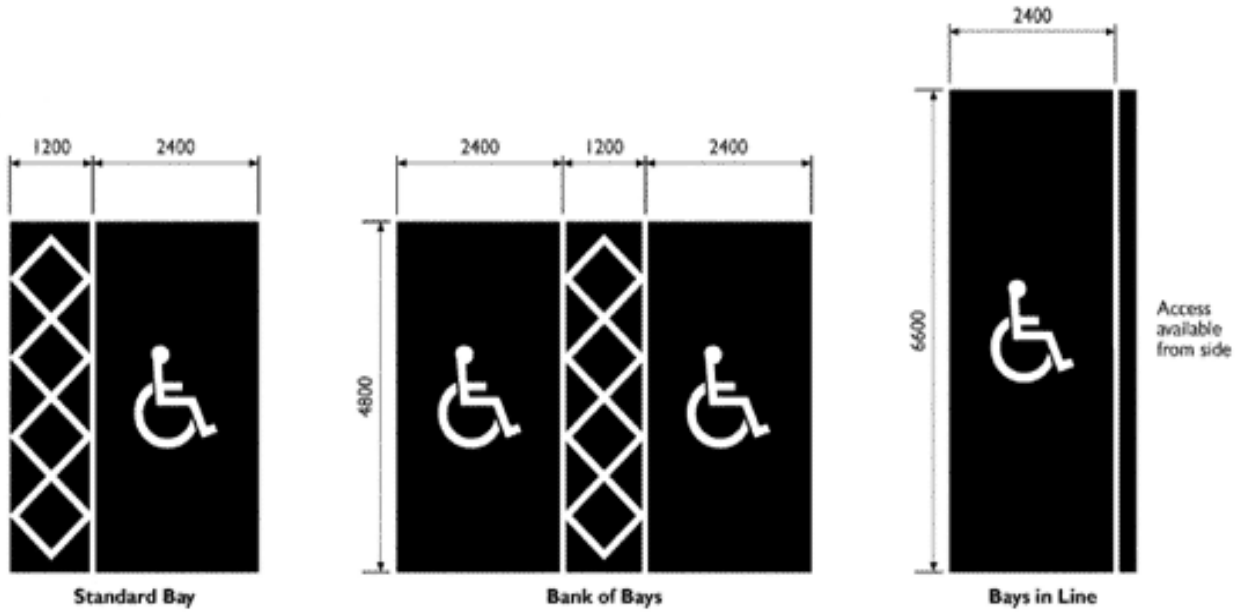
- For car parks associated with existing employment premises: 2% of the total car park capacity, with a minimum of one space;
- Spaces for disabled employees must be additional to those recommended above; reservations could be ensured, for example, by marking a space with a registration number;
- For car parks associated with new employment premises: 5% of the total parking capacity should be designated (to include both employees and visitors); and
    - For car parks associated with shopping areas, leisure or recreational facilities, and places open to the general public: a minimum of one space for each employee who is a disabled motorist, plus 6% of the total capacity for visiting disabled motorists.

The numbers of designated spaces may need to be greater at hotels and sports stadia that specialize in accommodating groups of disabled people.

Car parking spaces for people with disabilities should be located as close as possible to the main entrance (or to an alternative fully accessible entrance if the main entrance does not meet these requirements). Appropriate dropped kerbing should be provided. Adequate space should be provided to enable wheelchair users to easily gain access to and from their cars. Typical layouts are shown below.

Parking for Disability Scooters

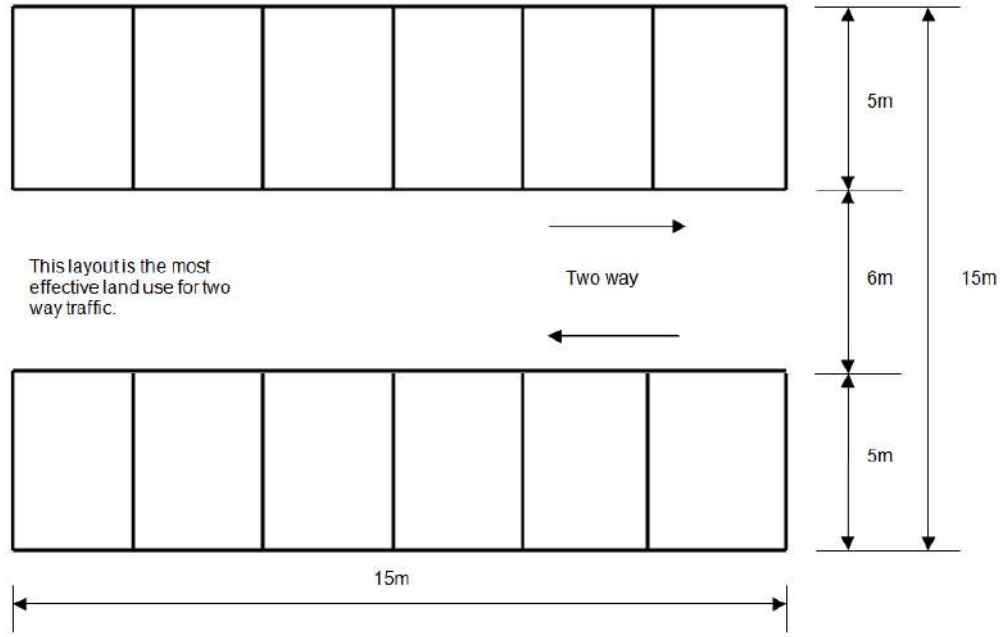
All normal parking restrictions should be observed. Vehicles should not be left unattended if they cause an obstruction to other pedestrians – especially those in wheelchairs.



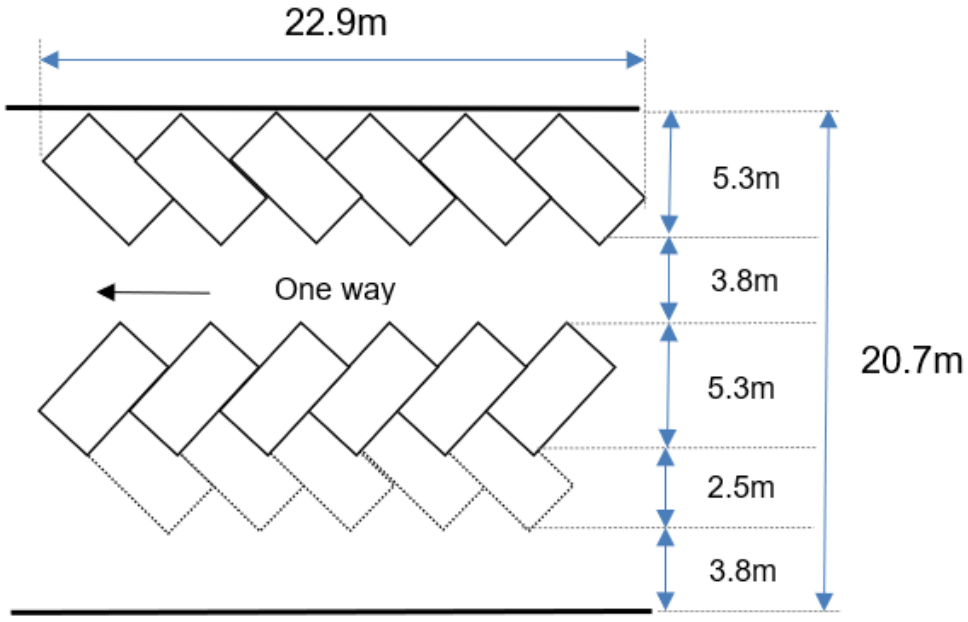
Layout of Parking Spaces

A standard parking space should be 2.5 x 5 metres and typical parking layouts are detailed below:

Two Way Flow



One Way Flow 45 Degree Angled Parking



TYPE OF DEVELOPMENT	GUIDANCE (We recommend early engagement on parking provision requirements)	NOTES
RESIDENTIAL		
Houses and flats (including Aged Person Dwellings)	2 spaces for a dwelling with 3 or less bedrooms and 3 spaces for dwellings with 4 or more bedrooms	If the dwelling is considered to be in a sustainable location the Highways and Lead Local Flood Authority may restrict car parking provision or accept a reduction in spaces to those recommended. A garage plus the space immediately in front of it will count as one space, only when the garage is of adequate size to allow for car parking and general storage.
Sheltered Housing – Warden Aided Accommodation	1 space per 2 units	
Community Homes – Homes for the Elderly/Children/Physically or Mentally Handicapped	1 space per 3 residents	More spaces may be required depending on the level of care offered. For example, a home for the physically handicapped may require a higher number of visiting/resident health professionals than a home for the elderly. This needs to be taken into account when designing car parking areas. Off road parking and turning provision for service vehicles should also be considered.
Halls of Residence/Nurses Homes/Other Residential Hostels	To be assessed on individual merits	The parking provision must be adequate to address the requirements of the use. A Transport Assessment which makes comparisons to similar sites may be required to demonstrate that the provision to be provided, meets the needs of the use. Any existing parking restrictions in the vicinity of the proposed site should also be taken into account, to avoid on street parking and obstruction issues, that may increase if adequate on-site provision is not provided.

RETAIL		
Food Retail	1 space per 14m² gfa	In general, parking provided within town centres will normally be expected to be short stay and available for general public use, subject to the Local Planning Authority's agreement. A Transport Statement/Assessment will be required to demonstrate that the proposed parking provision is adequate. Off road parking and turning provision for service vehicles should also be considered and provided where necessary.
Non – Food Retail	1 space per 20m² gfa (including any external display area)	See above.
EMPLOYMENT		
Offices	1 space per 30m² gfa	A Transport Statement/Assessment will be required to demonstrate that the proposed parking provision is adequate for the use. Off road parking and turning provision for service vehicles should also be considered and provided where necessary.
General Industry	1 space per 65m² gfa	See above.
Warehousing	1 space per 150m² gfa	See above.
EDUCATION		
Nursery Schools/Primary Schools/Secondary Schools	To be assessed on individual merits, but typically 1 space per 2 staff plus an allowance for visitors.	A School Travel Plan is likely to be required in support of any proposal. Off road parking and turning provision for service vehicles should also be considered and provided where necessary.
Higher and Further Education	To be assessed on individual merits, but typically 1 space per 2 staff plus 1 space per 15 students	A Transport Assessment and/or Travel Plan are likely to be required in support of any proposal. Off road parking and turning provision for service vehicles should also be considered and provided where necessary

OTHER DEVELOPMENT TYPES		
Cinema/Theatres/Conference Facilities/Bingo Halls/Other Places of Assembly with fixed seating	1 space per 5 seats	Off road parking and turning provision for service vehicles should also be considered and provided where necessary.
Sports Facilities (e.g. Leisure Centre/Swimming Pools/Squash Clubs)	To be assessed on individual merits	A Transport Assessment and/or Travel Plan is likely to be required in support of any proposal. This will need to include provision of coach parking at larger sites. Off road parking and turning provision for service vehicles should also be considered and provided where necessary.
Restaurants/Cafes/Public Houses/Licensed Clubs	1 space per 3m² public drinking area + 1 space per 5m² public dining area	Additional facilities, such as accommodation and conference facilities will need to be assessed separately in accordance with the appropriate standard. Off road parking and turning provision for service vehicles should also be considered and provided where necessary.
Hotels	1 space per bedroom	Additional facilities, such as bars/dining rooms open to the general public and conference facilities will need to be assessed separately in accordance with the appropriate standard. Off road parking and turning provision for service vehicles should also be considered and provided where necessary.

Construction Management Plans and SuDS Method Statements

The purpose of producing a Construction Management Plan and SuDS Method Statement is to ensure that the developer and their contractors have adequately considered measures to manage impact to the existing highway network and taken reasonable steps to ensure risks from flooding and pollution are appropriately mitigated during the construction phase of the development.

The programming of SuDS construction is a vital consideration throughout all stages of the construction process.

The main aim is to ensure the cleanliness of SuDS components during the construction phase.

The structure of the drainage will often be formed during the earthworks phase, but final construction should not take place until adequate provision has been made to protect SuDS features for the remainder of the construction phase. Consideration must be given to how surface water will be managed for this temporary period without causing flooding to surrounding land.

Please refer to Construction Management Plan and SuDS Method Statement Guidance Document and CIRIA SuDS Manual for advice.

Construction Traffic Damage to Highway

In accordance with Section 59 of the Highways Act 1980, developers should be considerate of causing damage to the existing highway during construction and implement mitigation measures as necessary. Should extraordinary expenses be incurred by the Highway Authority in maintaining the highway by reason of damage caused by construction traffic, the Highway Authority may seek to recover these expenses from the developer.

Highway & SuDS Agreements & Adoption

Adoption of Highways, SuDS, Public Open Spaces and Parking Areas

Adoption is the Final Stage (Stage 4), of the combined four stage approach for the design and construction of highways, SuDS and local flood risk mitigation measures. The Developer should consult the most appropriate SuDS adopting authority i.e. HLLFA, Water and Sewerage Company, Internal Drainage Board or Local District Council at the earliest stage in the planning and design process. Agreement in principle to adopt various roads, services (including sustainable drainage facilities) and any flood risk mitigation measures should be obtained. Failure to do so could result in additional costs to the Developer. In general, the following approach to adoption of assets will apply as shown below:

FEATURES	ADOPTING AUTHORITY / ENTITY
Roads (including gullies and connections), footways, cycleways and areas within visibility splays.	HLLFA under the Highways Act 1980.
Street lighting on adoptable roads.	HLLFA under the Highways Act 1980.
*Sustainable surface water drainage systems for the primary purpose of draining the highway only and serving 5 or more properties (may be acceptable to drain surface water from domestic property).	HLLFA under the Highways Act 1980.
*Sustainable surface water drainage systems for the primary purpose of draining the highway only and serving less than 5 properties.	Management Company or Residents.
*Sustainable surface water drainage systems for the primary purpose of draining property (may be acceptable to drain surface water from the highway).	Water and Sewerage Company under Section 104 Water Industry Act 1991 (and recover costs via water rates).
*Sustainable surface water drainage features in public open spaces, comprising large earth channels, basins and ponds.	Local District Council, Internal Drainage Board or Management Company.
Foul Water Sewers.	Water and Sewerage Company under Section 104 Water Industry Act 1991 (and recover costs via water rates).
Public open spaces, amenity areas and play areas.	Local District Council.
Non-HLLFA adopted parking Areas.	Management Company or Residents.
Local flood risk mitigation features.	IDB, Local District Council, Management Company or Residents.

HLLFA Adoption Criteria for SuDS

For the detailed specification and construction of new, adoptable roads and sustainable drainage features, please refer to the HLLFA's Lincolnshire Development Road and Sustainable Drainage Specification and Construction document.

The HLLFA will generally adopt SuDS components if they are:

- Necessary to drain the highway;
- Adjacent to the highway;
- Visually part of the highway; and
- An integral part of the highway system. i.e. permeable surfaces, filters, filter drains and strips, swales, pipes and accessories (excluding below ground attenuation crates).

Where it is necessary for rainwater from private residential property to drain to the highway drainage system, the HLLFA will consider accepting these flows as part of an integrated system.

The HLLFA will adopt appropriate SuDS structures once written evidence of the Water and Sewerage Company agreement to adopt its part of the SuDS management train has been provided by the developer. In some instances, this may be prior to the Water and Sewerage Company's formal adoption agreement being finalised.

An up-to-date and complete Health & Safety file (including as built drawings and a comprehensive SuDS maintenance plan), is to be provided by the developer to the HLLFA immediately prior to HLLFA adoption of highway and SuDS assets.

Drawings

In addition to obtaining planning permission from the District Council, road constructional details and SuDs constructional details must be approved in writing by the HLLFA before any works start on site. In the first instance, the Developer must provide two complete copies of the drawings and details of the proposed road, street and SuDS as shown in the following table.

Upon completion and before the development is entered into the maintenance period, the developer shall carry out an as built drainage and carriageway level survey and provide the HLLFA with as built drawings showing the as built levels plotted against the design sections to demonstrate compatibility with the design, and to ensure that minimum falls are achieved.

Drawings Required to Enable Highway and SuDS Assets to be Considered for Adoption (Refer also to Appendix 2, Lincolnshire Development Road and Sustainable Drainage Specification and Construction)	
1	Location plan to scale note less than 1:2500.
2	The road, the subject of the application, to a scale not less than 1:500 including layout and full details of surface water drainage, foul water drainage, street lighting proposals, carriageway markings and signs, and all mains and services within the proposed highway.
3	Longitudinal sections including surface water and foul water drainage to a horizontal scale not less than 1:500 and to a vertical scale of 1:100.
4	Typical cross sections of construction proposed and all other details in accordance with the typical detail drawings given in the HLLFA's Lincolnshire Development Road and Sustainable Drainage Specification and Construction document.
5	Cross sections of the highway at intervals of not greater than 30 metres and to a scale of 1:100 horizontal and 1:50 vertical where the adjoining site levels vary 0.5 metres + or - from finished footway levels. The cross sections must extend to the building line of the proposed properties.
6	The survey of the site and the levels taken thereon shall be subject to the following tolerances: - a. Horizontal + or - 60mm on paved areas + or - 300mm on unpaved areas b. Vertical + or - 5mm on paved areas + or - 1OOmm on unpaved areas.
7	The following note shall be incorporated on all drawings submitted: - "The specification in all respects shall be in accordance with the current "Development Road and Sustainable Drainage Specification and Construction" publications in force in the County at the time of construction.
8	Designer's risk assessments for the design, operation and maintenance of the highway drainage system.
9	Where easements, wayleaves, consents and the like are necessary the Developer is required to submit a draft of any such document to the Highway and Flood Authority. Technical approval will not be granted until the documents have been approved. Should the circumstances of the easements, wayleaves consents and the like change following approval the Highway and Flood Authority must be notified in writing immediately. In these circumstances the Highway and Flood Authority reserves the right to rescind technical approval until new easements, wayleaves, consents and the like have been submitted.

Details for any part of the drainage network which is classified as a small highway structure (such as headwalls) shall be submitted for approval by the HLLFA. Please refer to the Small Structures Design Guide.

Sustainable Drainage System Service Fee

When adopting SuDS components, in addition to existing highway related bonds, fees and charges, and where private water is allowed to drain to the highway drainage system; a "one off" service payment will be required by the HLLFA from the Developer. Payment is required prior to commencement of SuDS construction and is related to the current Water and Sewerage Company surface water charge levied on property already connected to surface water sewerage infrastructure. Calculation details of this service payment will be provided by the HLLFA at pre-planning application consultation stage.

The HLLFA will not adopt SuDS components that are "off-line" or remote from the highway. Also, the HLLFA will only consider adoption of the highway and relevant SuDS as an integrated process and not as separate entities.

SuDS Scheme Operation and Maintenance Plan

The HLLFA require an Outline SuDS Scheme Operation and Maintenance Plan to be provided for submission at the Outline Planning, and a Full SuDS Scheme Operation and Maintenance Plan for Full Planning or Approval of Reserved Matters planning stages, as well as for the Draft Section 38 Highway and SuDS Adoption Agreement.

The plan should cover regular, occasional and remedial maintenance, plus SuDS asset replacement, and provide the HLLFA with details of all operations and routine maintenance activities necessary throughout the full design life of all SuDS assets involved, and for the lifetime of the development. The content should be simple and straight forward, and include operation and maintenance checklists and schedules etc. plus details of specific SuDS asset design life and timescales for asset replacement, for HLLFA officers to use. The Operation and Maintenance Plan provided as part of the Section 38 adoption process, should include “as built” drawings and clearly show who is responsible for all drainage assets. The Plan will be part of the documentation required under CDM (i.e. part of the health and safety file).

Guidance on the contents of the Operation and Maintenance Plan is provided in the table below and more detailed guidance is provided in *Chapter 32 and Appendix B, SuDS Manual (C753)

SuDS Scheme Operation and Maintenance Plan	
1	Location of all SuDS components on the site.
2	Brief summary of design intent, how the SuDS components work, their purpose and potential performance risks.
3	Depth of silt that will trigger requirement for removal.
4	Visual indicators that will trigger maintenance.
5	Depth of oil in separators etc. that will trigger removal.
6	Maintenance requirements (i.e. see *Chapter 32.10 and Appendix B, SuDS Manual (C753)) and a maintenance record pro-forma.
7	Explanation of the objectives of the maintenance proposed and potential implications of not meeting those objectives split into planted and hard elements.
8	Identification of areas where certain activities are prohibited (e.g. stock-piling materials on pervious surfaces).
9	An action plan for dealing with accidental spillages of pollutants.
10	Advice on what to do if alterations are to be made to a development, or if service companies need to undertake excavations or similar works that could affect the SuDS.
11	Details of who to contact in the event of pollution or the system is not working.
12	Details of specific SuDS asset design life and timescales for asset replacement.

Commuted Maintenance and Asset Replacement Payments

The County Council's policy on commuted maintenance payments is that, the Director of Highways and Planning is authorised to charge developers for items that he deems will cause future additional budget pressures. The following items will require commuted maintenance and asset replacement payments, along with others that the Director may deem necessary:

Traffic Signals

Where signals are used to provide safe and adequate access to a development a commuted payment will be required (usually as part of a Section 278 Agreement).

Structures

The provision of retaining walls, bridges or large drainage pipes (above 300mm dia.)

Non-Standard Surfacing

Proposed carriageway, footway surfacing, kerbs, gullies and ironwork that are not contained in the current Development Road Specification and Construction, which are accepted by the HLLFA will require a commuted payment.

Street Lighting Columns

Alternative columns which are not to the HLLFA's current standards will also require a commuted maintenance payment.

Other Non-Standard Features

Any features, such as statues etc. Such features will also require a licence before being placed within the highway.

Developers should contact the HLLFA and check the charges that will be made.



Advanced Payments Code (APC) / Section 38 Agreements - Highways Act 1980

The HLLFA has a statutory duty to operate the Advanced Payments Code (APC), whereby developers are required to deposit, with the HLLFA, the full cost estimated to construct the access to the nearest public highway, to an acceptable standard. This is not required where developers enter into a Section 38 Agreement with the HLLFA.

APCs shall be served on residential developments of six or more dwellings and 100 yards or greater in length.

Developers are required to enter into a Section 38 Agreement with the HLLFA to enable formal adoption of highways and SuDS. All Section 38 Agreements are required to be supported by a guaranteed Bond, to cover the full cost of the works required to construct the roads and SuDS to an adoptable standard. The HLLFA also requires a Development Road Fee based on a percentage of the Bond, to cover the cost of checking drawings, inspections and testing.

Full title to all land to be dedicated, is required to be submitted and checked before such an Agreement can be completed.

Works should not commence on site until either the APC sum has been deposited or the Section 38 Agreement signed.

Section 278 Agreements - Highways Act 1980

Where it has been agreed that there are some road improvement works that can be carried out to overcome the highway objections to a development, developers are required to enter into a Section 278 Agreement with the HLLFA. The Developer should be aware that the HLLFA reserve the right to carry out the design of all such schemes, making a charge, based on a percentage of the cost of the works. A charge is also made for supervision/inspection and testing of the works.

The Developer will appoint the contractor (subject to HLLFA approval) and pay all the cost of the necessary works. The Developer shall also be responsible for any claims, under the Land Compensation Act, which can be made up to 7 years after the works have been completed.

Useful Guidance Documents

Manual for Streets

All Local Transport Notes

SuDS Maintenance and Adoptions Options (England) Factsheet – Susdrain

Planning for SuDS – Making It Happen CIRIA C687

Site Handbook for the Construction of SuDS – CIRIA C698

English Non-Statutory Technical Standards for Sustainable Drainage – DEFRA

Non-Statutory Technical Standards for Sustainable Drainage – Practice Guidance – LASOO

Anglian Water SuDS Adoption Manual

Guidance on the Construction of SuDS C768

Design Manual for Roads and Bridges

Transport Assessment and Travel Plans

Parking Standards

Use of Planning Conditions

Gear Change: A Bold Vision for Cycling and Walking

CIHT – Better Planning, Better Transport, Better Places

Local Transport Note 1/20 Cycle Infrastructure Design

Creating Better Streets – Inclusive and Accessible Places

Lincolnshire Streetscape Design Manual

Contact Us

Please get in touch via the below;

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Phone:	01522 782 070
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	Lincolnshire County Council
	County Offices
	Newland
	Lincoln
	LN1 1YL

DM Technical Validation Checklists for Highways, a Flood Risk Assessment (FRA), Drainage Strategy (DS), Ground Investigation (GI) & Geotechnical Report (GR)

Major Development

The National Planning Policy Framework (NPPF) expects SuDS to be considered where appropriate for all major developments (as set out in Article 2(1) of the Town and Country Planning (Development Management Procedure) (England) Order 2010)

"Major Development" means 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;

It is the responsibility of local planning authorities to consult LCC HFA on the management of surface water and using conditions and/or obligations, to deliver appropriate SuDS through the planning process. This includes securing clear arrangements for ongoing maintenance of SuDS assets for the lifetime of the development.

Application Number:	**LPA & Ward:**
LPA Case officer:	**LCC HFA Case officer:**

NOTES & COMMENTS

(including from Site Visits)

Major Development Consultation Requirements for Highways, Flood Risk, SuDS & SW Drainage

Essential information (in italics) is required at each planning stage or "Object" to the Planning Application on the grounds of "lack of sufficient information provided".

Notes:	Reviewed & accepted
First HFA Contact & Pre Planning (LEVEL 1 - Concept): • **HFA Planning Advice Form;** • ***Level 1 FRA*; and** • ***Conceptual scheme design (incl. DS).***	
Outline Planning Permission (LEVEL 2 - Outline): • ***Highways Information*** • ***Level 2 FRA*** *(if risk from local sources exists);* • ***Level 2 Ground Investigation*** *(i.e. infiltration, groundwater, greenfield run-off & storage volume);* • ***Level 2 Outline Whole Site DS AS PART OF Level 2 Outline Whole Site Development Layout Plans, Highways, SuDS & Flood Risk Scheme Design proposals;*** • **Transport Assessment & Travel Plan** (for 80+ homes); and • **Travel Statement** (depending on specific development content) Note: For further information on the requirements for a TA, TP and TS, please refer to the HFA Development Design Approach (DDA)..	
Reserved Matters & Full Planning Permission (LEVEL 3 - Detailed): • ***Highways Information*** *(If not already provided at Outline Planning)* • ***Level 3 FRA*** *(if risk from local sources exists);* • ***Level 3 Detailed Whole Site DS AS PART OF Level 3 Detailed Whole Site Development Layout Plans, Highways, SuDS & Flood Risk Scheme Design proposals*** • ***Level 3 Detailed Geotechnical Interpretive Report*** *(i.e. infiltration, groundwater, greenfield run-off & storage volume);* • **Detailed whole site Landscape Plan;** • **Whole site Development Construction Management Plan.** If not already provided at Outline Planning then: • ***Transport Assessment (TA) & Travel Plan (TP)*** *(for 80+ homes); and* • ***Travel Statement (TS)*** *(depending on specific development content).* Note: If no Outline Application is made, then the Outline Planning requirements above should be also provided. For further information on the requirements for a TA, TP and TS, please refer to the HFA Development Design Approach (DDA)..	

HIGHWAYS INFORMATION

<table>
<tr><th colspan="2">Highways Technical Validation Checklist</th><th>Comments / Notes</th></tr>
<tr><td colspan="3">Technical validation check to cover essential items a) to r) below:</td></tr>
<tr><td colspan="3">NPPF</td></tr>
<tr><td>a)</td><td>Significant Movements – TA Required
(Typically >500 vpd or 80 dwellings)</td><td></td></tr>
<tr><td>b)</td><td>Sustainable – location / connectivity</td><td></td></tr>
<tr><td>c)</td><td>Safe & suitable access for all users</td><td></td></tr>
<tr><td>d)</td><td>Cumulative Residual Impact - Severe</td><td></td></tr>
<tr><td>e)</td><td>Obligations : Necessary, directly relevant, fair & reasonable</td><td></td></tr>
<tr><td colspan="3">MfS</td></tr>
<tr><td>f)</td><td><u>Review of Existing Conditions</u></td><td rowspan="5"></td></tr>
<tr><td>g)</td><td>Location</td></tr>
<tr><td>h)</td><td>Speed</td></tr>
<tr><td>i)</td><td>Accidents</td></tr>
<tr><td>j)</td><td>Capacity – queues</td></tr>
<tr><td>k)</td><td>Parking</td><td></td></tr>
<tr><td>l)</td><td><u>Acceptability of Proposal</u></td><td rowspan="6"></td></tr>
<tr><td>m)</td><td>Layout (alignments, widths, radii)</td></tr>
<tr><td>n)</td><td>Turning / Swept Paths</td></tr>
<tr><td>o)</td><td>Parking</td></tr>
<tr><td>p)</td><td>Visibility
<table>
<tr><td>Speed (mph)</td><td>20</td><td>30</td><td>40</td><td>50</td><td>60</td></tr>
<tr><td>y distance (m)</td><td>25</td><td>43</td><td>65</td><td>92</td><td>124</td></tr>
</table></td></tr>
<tr><td>q)</td><td>Mitigation</td></tr>
<tr><td>r)</td><td>Highways to be adopted:
Pervious paving proposed then CBR > 3%</td><td></td></tr>
</table>

FLOOD RISK ANALYSIS - Flood Risk Assessment (FRA)

Note:

1. The tables below show necessary information relating to local sources of flood risk which is to be provided in the FRA, & be considered & accepted by HFA.
2. Strategic issues & NON local sources of flood risk should be considered by EA.
3. Hydraulic calculations for flood risk purposes are necessary in "Level 3" Flood Risk Assessments.
4. Hydraulic calculations for highway drainage purposes should be provided in the "Level 3" **Whole Site Drainage Strategy &/or Whole Site Drainage Design Proposals.**
5. Need to consider a pyramid approach to the amount of detail required at each Level (i.e. lesser detail at "Level 1" & greater detail at "Level 3".
6. The amount of detail required from the Developer for each specific FRA will vary & be dependent on the scale & nature of the flood risk to & from the development.
7. See further advice in National Planning Practice Guidance (NPPG), Development & Flood Risk Guidance for the Construction Industry - (Ciria C624) Appendix A2, and FRA Guidance For New Development: Phase 2 FD2320/TR2 (web search for pdf doc).

"Level 1" Screening Study Flood Risk Assessment Requirements (Ciria C624)		
The objectives of the "Level 1" FRA process as part of a tiered approach are to: • Develop a joint understanding of the potential flood risk to a development site; and • HFA, Developer & the LPA to agree what aspects of local sources of flood risk need to be addressed in a more detailed flood risk assessment. Specific questions etc. need to be answered and include those listed below:		Reviewed & accepted
	Technical validation check to cover essential items a) to f) below:	
a)	What type of development is proposed (e.g., new development, an extension to existing development, a change of use etc.) and is it considered to be Major, Minor "A" or Minor "B" development?	
b)	What is its flood risk vulnerability classification?	
c)	Which Surface Water Flood Zone the site located in i.e. "High", "Medium", "Low" or "Very Low".	
d)	Is the development site, or part of the development site, identified as being at risk of flooding from surface water &/or groundwater sources within available documentation?	
e)	Are the LPA / HFA / EA aware of any existing, historical or potential flooding problems that may affect the site? (For HFA refer to the Sec.19 Flood Investigations information.)	
f)	Is the development site located within an Internal Drainage District (IDB) or within an IDB Extended Area & if so which one?	
In addition, the remaining items below should be considered by the Developer as "Good Practice".		
f)	Is the development site located within 10m of a flood or drainage structure? (Refer to the HFA Flood & Drainage Asset Register & Map for further information)	
g)	Is it also in a EA Flood Zone & if so, which one? (As a first step, check the Flood Map for Planning (Rivers and Sea) on the Environment Agency's web site).	

h)	If there is an existing property on, or next to the site at the same internal threshold level.	
i)	Do the physical characteristics of the site suggest that it may be prone to flooding?	
j)	Is the development located within a natural or artificial hollow, or at the base of a valley or at the bottom of a hill slope?	
k)	Does examination of historical maps indicate any likelihood of flood risk at the site?	
l)	Do the names of surrounding roads, areas or houses suggest the possibility of seasonal or historical flooding?	
m)	Is the site likely to involve excavation / construction below existing ground levels (excluding foundations)?	
n)	Is the land use upslope of the site such that the generation of overland flow may be encouraged, and can water from this area flow onto the site?	
o)	Are there any artificial drainage systems on or next to the site, at the same level, or upslope of, the site?	
p)	Is the development site located upstream of a culvert which may be prone to blockage?	
q)	Is the development site next to or downstream/down-slope of a canal?	

"Level 2" Scoping Study
Flood Risk Assessment Requirements
(Ciria C624)

The objectives of the "Level 2" FRA process as part of a tiered approach are listed below:		Reviewed & accepted
	Technical validation check to cover essential items a) to e) below:	
a)	Review Level 1 FRA & re-state content where needed to complete scoping exercise.	
b)	Develop an understanding of natural flow paths (above & below ground level) & the mechanisms of flooding at the site (including outline topographic survey – SEE SUPPORT INFORMATION).	
c)	Confirm whether the site is in a "High", "Medium", "Low" or "Very Low" surface water flood risk zone.	
d)	Produce a preliminary qualitative assessment of the potential impact to the site & downstream of, and constraints to, the proposed development.	
e)	Priority should be given to using Sustainable Drainage Systems (SuDS).	
In addition, the remaining items below should be considered by the Developer as "Good Practice".		
f)	Identify available data.	
g)	Develop an understanding of the potential development design that may be employed at the site.	

"Level 3" Detailed Study Flood Risk Assessment Requirements (NPPF PPG Para 068)		
A Level 3 FRA to be undertaken to such a level of detail that an outline design/master plan can be presented to the HFA and LPA for consideration. Specific questions etc. need to be answered and include those listed below:		Reviewed & accepted
	Technical validation check to cover essential items a) to j) below:	
a)	Review of Level 1 and 2 FRA & re-consider content where applicable.	
b)	Confirm the type of development proposed (e.g., new development, an extension to existing development, a change of use etc.) and where will it be located?	
c)	Confirm the flood risk vulnerability classification	
d)	For each identified source, can you describe how flooding would occur, with reference to any historic records where these are available? E.g. Sec.19 Flood Investigations & seek advice.	
e)	What are the existing surface water drainage arrangements for the site as provided in the **Drainage Strategy &/or Detailed Whole Site Drainage Design Proposals?**	
f)	Confirm which EA Flood Zone the site is within? (Check the Flood Map for Planning (Rivers and Sea) on the Environment Agency's web site).	
g)	Confirm the probability of the site flooding, taking account of the maps of flood risk from rivers and the sea and from surface water, on the Environment Agency's web site, and any further flood risk information.	
h)	The existing rates and volumes of surface water run-off generated by the site, & assessment of the suitability of the receiving watercourse?	
i)	How is flood risk at the site likely to be affected by climate change? Further information on climate change and development and flood risk is available in the NPPF PG.	
j)	Assessment of: • the proposed impacts of the development; • how will the site/building be protected from flooding; & • how you will ensure that your proposed development and the measures to protect your site from flooding will not increase flood risk elsewhere. All including the potential impacts of climate change over the development's lifetime as provided in the **Detailed Whole Site Development Layout Plans**, **Highways, SuDS & Flood Risk Scheme Design Proposals.**	
In addition, the remaining items below should be considered by the Developer as "Good Practice".		
k)	Modelling where necessary to define the existing flood hazard (e.g. what sources of flooding could affect the site?), including climate change over the lifetime of the development, (including detailed topographic survey – SEE SUPPORT INFORMATION).	
l)	Are there any opportunities offered by the development to reduce flood risk elsewhere?	
m)	What flood-related risks will remain after you have implemented the measures to protect the site from flooding, & how will flood risk design exceedance flows be routed away from property?	
n)	Sensitivity testing to demonstrate that the estimates of flood risk to, & arising from, the site are not overly dependent on the assumed model parameters.	
o)	How, and by whom, will these risks be managed over the lifetime of the	

	development? (e.g., flood warning and evacuation procedures).	

DRAINAGE STRATEGY REQUIREMENTS (DS)

Note:

1. The drainage strategy should set out and review existing local sources drainage measures on, and off site (i.e. areas surrounding and impacted by development of the site).
2. It should assess and quantify the drainage and flood impact of the proposed development both on and off site taking climate change into account.
3. It should expand the FRA or FRS with local sources drainage and management proposals, and justify their effectiveness for the lifetime of the development.
4. Priority should be given to using Sustainable Drainage Systems (SuDS).
5. In addition, the DS should outline proposed plans for local sources infrastructure ownership, adoption and maintenance.
6. The tables below show necessary information relating to local sources drainage which is to be provided in the DS, & be considered & accepted by HFA.
7. Detailed hydraulic calculations for highway drainage purposes should be provided in the **"Level 3" Whole Site Drainage Strategy &/or Whole Site Drainage Design Proposals.**
8. Need to consider a pyramid approach to the amount of detail required at each Level (i.e. lesser detail at "Level 1" & greater detail at "Level 3".
9. The amount of detail required for each specific DS will vary & be dependent on the scale & nature of the flood risk to & from the development & local sources drainage complexity.
10. See further advice in the National Planning Practice Guidance (NPPG) "Reducing the causes & impacts of flooding", SuDS Manual (C753) Section 7.5.7 & Appendix B, Flood Risk Assessment for the Construction Industry - Ciria C624 Appendix A2, and FRA Guidance For New Development: Phase 2 FD2320/TR2 (web search for pdf doc).

"Level 1" Concept Proposals for Whole Site Highways, SuDS & Flood Risk Scheme Design SuDS Manual (C753) Appendix B1 Table B1		
Specific information needs to be provided as listed below:		Reviewed & accepted
	Technical validation check to cover essential items a) to f) below:	
a)	Natural & Artificial Drainage Catchment Plan showing land contours, topography and watercourses both surrounding and impacting the site.	
b)	Site Location Plan showing existing use of site, supported by recent photographs.	
c)	Existing site layout plan showing overall topography (ground level contours) across the site, the position of roads, access points, footpaths, road drains, watercourses and any other flood risk or surface water drainage features that need to be taken into account.	
d)	Concept drawings, of the proposed development layout (or layout options), showing the location of roads and sustainable drainage features (including water quality measures), plus any potential flood risk protection features that may be required.	
e)	Outline sizing of site layout areas/zones to confirm sufficient area for SuDS allowed, & initial thoughts on SuDS adoption & maintenance responsibilities.	
f)	Is the development site located within an Internal Drainage District (IDB) or within an IDB Extended Area & if so which one?	

"Level 2" Drainage Strategy Requirements AS PART OF THE Outline Whole Site Development Layout Plans, Highway, SuDS & Flood Risk Scheme Design Proposals

Refer also to SuDS Manual (C753), Appendix B, Table B.2, SuDS Manual (C753), Appendix B, Table B.4 - Scheme Design Assessment Checklists; CIRIA RP992/19 - Infiltration assessment Checklist - to assist the geotechnical summary.

Specific information needs to be provided as listed below:		Reviewed & accepted
	Technical validation check to cover essential items a) to o) below:	
a)	Review Level1 information provided.	
b)	"Level 2" Outline Topographic Survey showing site location and type of development (SEE SUPPORT INFORMATION).	
c)	Outline drawings of proposed development, preliminary layout of surface water drainage infrastructure and landscaping.	
d)	Reference to planning conditions, reserved matters, and to the FRA.	
e)	Existing on site and relevant off site features including geology & desktop ground information (SEE DETAILED REQUIREMENTS BELOW in "Level 2" Desktop Ground Investigation Information checklist.)	
f)	Provide groundwater levels and location of, and impacts on, any Surface Water Safeguard Zones, Groundwater Safeguard Zones, Water Protection Zones, and/or Groundwater Nitrate Vulnerable Zones.	
g)	Summary of the hydrology including descriptions of existing drainage assets and features, and ownership of existing features and their condition and performance.	
h)	Summary of existing and drainage related flood risks, including surface water, discharges, existing flood flow paths, groundwater and other sources.	
i)	Summary of greenfield & brownfield runoff rate calculations;	
j)	Geotechnical factual & interpretative reports, including infiltration potential evidence and soil type for SPR calculations; (SEE DETAILED REQUIREMENTS BELOW in "Level 2" Desktop Ground Investigation Information checklist.)	
k)	Outline sustainable drainage (SuDS) design proposals – if not SuDS then an explanation why.	
l)	Summary of existing and proposed impermeable and permeable areas.	
m)	"Level 2" Outline Whole Site Drainage Proposals (i.e. Summary of surface water storage calculations, infiltration calculations & preliminary hydraulic calculations) - (SEE SUPPORT INFORMATION).	
n)	Details of current and future ownership of surface water drainage assets, adoption and future maintenance proposals. (SEE SUPPORT INFORMATION.)	
o)	Outline of need for drainage related flood risk mitigation measures, stating their location, type and features.	
In addition, the remaining items below should be considered by the Developer as "Good Practice".		
p)	Summary of amenity and biodiversity value and proposals to maintain or enhance where possible.	
q)	Outline Water Quality Treatment Strategy (SEE SUPPORT INFORMATION).	
r)	Avoiding duplication with the above & where appropriate, also provide further drainage design documentation suggested in the SuDS Manual (C753), Appendix B, Table B.2.	

"Level 3" Drainage Strategy Requirements AS PART OF THE Detailed Whole Site Development Layout Plans, Highway, SuDS & Flood Risk Scheme Design Proposals

Refer also to SuDS Manual (C753), Appendix B, Table B.3, SuDS Manual (C753), Appendix B, Table B.4 - Scheme Design Assessment Checklists; SuDS Manual (C753), Appendix B, Section B.5 - SuDS Components Design Checklists; CIRIA RP992/19 - Infiltration assessment Checklist - to assist the geotechnical summary.

Specific information needs to be provided as listed below:		Reviewed & accepted
	Technical validation check to cover essential items a) to o) below:	
a)	Review "Level 1" & "Level 2" information provided.	
b)	"Level 3" Detailed Topographic Survey showing site location and type of development. (SEE SUPPORT INFORMATION.)	
c)	Drawings of proposed development, layout of surface water drainage infrastructure and landscaping.	
d)	Reference to planning conditions, reserved matters, and to the FRA or FRS.	
e)	Existing on site and relevant off site features including topography and geology. (SEE DETAILED REQUIREMENTS BELOW in "Level 3" Detailed Geotechnical Interpretive Report checklist.)	
f)	Provide groundwater levels and location of, and impacts on, any Surface Water Safeguard Zones, Groundwater Safeguard Zones, Water Protection Zones, and/or Groundwater Nitrate Vulnerable Zones.	
g)	Detailed hydrology including descriptions of existing drainage assets and features, and ownership of existing features and their condition and performance.	
h)	Details of existing and drainage related flood risks, including surface water, discharges, existing flood flow paths, groundwater and other sources.	
i)	Geotechnical factual & interpretative reports, including infiltration potential evidence and soil type for SPR calculations. (SEE DETAILED REQUIREMENTS BELOW in "Level 3" Detailed Geotechnical Interpretive Report checklist.)	
j)	Detailed greenfield & brownfield runoff rate calculations.	
k)	Detailed sustainable drainage (SuDS) design proposals – if not SuDS then an explanation why.	
l)	Details of existing and proposed impermeable and permeable areas;	
m)	"Level 3" Detailed Whole Site Drainage Proposals (i.e. Detailed surface water storage calculations, infiltration calculations, outfalls & detailed hydraulic calculations all in accordance with the hierarchy of drainage options).- (SEE SUPPORT INFORMATION.)	
n)	Details of current and future ownership of surface water drainage assets, adoption and future maintenance proposals. (SEE SUPPORT INFORMATION.)	
o)	Details of need for & proposed drainage related flood risk mitigation measures, stating their location, type and features.	
In addition, the remaining items below should be considered by the Developer as "Good Practice".		
p)	Details of amenity and biodiversity value and proposals to maintain or enhance where possible.	
q)	Detailed Water Quality Treatment Strategy (SEE SUPPORT INFORMATION).	
r)	Avoiding duplication with the above & as appropriate, also provide drainage design documentation suggested in the SuDS Manual (C753),	

	Appendix B, Table B.3.	

Ground Investigation (GI) & Geotechnical Report (GR)

"Level 2" Desktop* Ground Investigation Information Requirements AS PART OF THE "Level 2" Outline Whole Site Drainage Strategy, and Outline Whole Site Development Layout Plans, Highway, SuDS & Flood Risk Scheme Design Proposals ***Except for e) below.** Preferable to have information based on the BGS Infiltration SuDS GeoReport as shown below		
Purpose: To show (in outline and in context with the development as a whole), that the existing and future ground structure and conditions are appropriate and sustainable for the highway and SuDS scheme proposed. Information that needs to be provided includes:		Reviewed & accepted
For Sustainable Drainage: (Refer also to the British Geological Survey Maps)		
	Technical validation check to cover essential items a) to e) below:	
a)	Significant constraints (incl. soluble rocks, landslides, shallow mining, shallow groundwater, made ground).	
b)	Drainage potential (incl. depth to water table, permeability of superficial deposits, thickness of superficial deposits, permeability of bedrock, presence of floodplains). **Critical to consider infiltration, groundwater table, greenfield run-off & surface water storage as necessary at this stage.**	
c)	Ground stability (incl. soluble rocks, landslides, shallow mining, running sands, swelling clays, compressible ground, collapsible ground).	
d)	Geological maps (incl. artificial deposits, superficial deposits, bedrock).	
e)	Where pervious pavements are proposed in certain soil types, soaked CBRs are required - seek advice where necessary. "Rule of Thumb" estimation of infiltration potential support information on DM version ONLY.	

"Level 3" Detailed Geotechnical Interpretive Report Requirements AS PART OF THE "Level 3" Whole Site Drainage Strategy, and Detailed Whole Site Development Layout Plans, Highway, SuDS & Flood Risk Scheme Design Proposals Refer to CIRIA RP992/19 - Infiltration assessment Checklist - to assist the geotechnical summary.		
Purpose: To show (in detail and in context with the development as a whole), that the existing and future ground structure and conditions are appropriate and sustainable for the highway and SuDS scheme proposed. Information that needs to be provided includes:		Reviewed & accepted
For Sustainable Drainage: (Refer also to the British Geological Survey Maps)		
	Technical validation check to cover essential items a) to d) below:	
a)	Build on Desktop Ground Investigation.	
b)	Detailed infiltration assessment (incl. evidence soil types & infiltration	

	coefficients) i.e. BRE Digest 365	
c)	Where possible, detailed evidence of groundwater table levels over recent 12 month period or other validated evidence.	
d)	Where pervious pavements are proposed in certain soil types, soaked CBRs are required - seek advice where necessary. . "Rule of Thumb" estimation of infiltration potential support information on DM version ONLY.	

DM Technical Validation Checklists for Highways, a Drainage Strategy (DS), Ground Investigation (GI) & Geotechnical Report (GR)

Major Development

The National Planning Policy Framework (NPPF) expects SuDS to be considered where appropriate for all major developments (as set out in Article 2(1) of the Town and Country Planning (Development Management Procedure) (England) Order 2010)

"Major Development" means 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;

It is the responsibility of local planning authorities to consult LCC HFA on the management of surface water and using conditions and/or obligations, to deliver appropriate SuDS through the planning process. This includes securing clear arrangements for ongoing maintenance of SuDS assets for the lifetime of the development.

Application Number:	**LPA & Ward:**
LPA Case officer:	**LCC HFA Case officer:**

NOTES & COMMENTS

(including from Site Visits)

Major Development Consultation Requirements for Highways, SuDS & SW Drainage

Essential information (in italics) is required at each planning stage or "Object" to the Planning Application on the grounds of "lack of sufficient information provided".

Notes:	Reviewed & accepted
First HFA Contact & Pre Planning (LEVEL 1 - Concept): • **HFA Planning Advice Form;** ***and*** • ***Conceptual scheme design (incl. DS).***	
Outline Planning Permission (LEVEL 2 - Outline): • ***Highways Information*** • ***Level 2 Ground Investigation*** *(i.e. infiltration, groundwater, greenfield run-off & storage volume);* • ***Level 2 Outline Whole Site DS AS PART OF Level 2 Outline Whole Site Development Layout Plans for Highways & SuDS Scheme Design proposals;*** • **Transport Assessment & Travel Plan** (for 80+ homes); and • **Travel Statement** (depending on specific development content) Note: For further information on the requirements for a TA, TP and TS, please refer to the HFA Development Design Approach (DDA)..	
Reserved Matters & Full Planning Permission (LEVEL 3 - Detailed): • ***Highways Information*** *(If not already provided at Outline Planning)* • ***Level 3 Detailed Whole Site DS AS PART OF Level 3 Detailed Whole Site Development Layout Plans for Highways & SuDS Scheme Design proposals;*** • ***Level 3 Detailed Geotechnical Interpretive Report*** *(i.e. infiltration, groundwater, greenfield run-off & storage volume);* • **Detailed whole site Landscape Plan;** • **Whole site Development Construction Management Plan.** If not already provided at Outline Planning then: • ***Transport Assessment (TA) & Travel Plan (TP)*** *(for 80+ homes); and* • ***Travel Statement (TS)*** *(depending on specific development content).* Note: If no Outline Application is made, then the Outline Planning requirements above should be also provided. For further information on the requirements for a TA, TP and TS, please refer to the HFA Development Design Approach (DDA)..	

HIGHWAYS INFORMATION

<table>
<tr><th colspan="2">Highways Technical Validation Checklist</th><th>Comments / Notes</th></tr>
<tr><td colspan="3">Technical validation check to cover essential items a) to r) below:</td></tr>
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<tr><td>a)</td><td>Significant Movements – TA Required
(Typically >500 vpd or 80 dwellings)</td><td></td></tr>
<tr><td>b)</td><td>Sustainable – location / connectivity</td><td></td></tr>
<tr><td>c)</td><td>Safe & suitable access for all users</td><td></td></tr>
<tr><td>d)</td><td>Cumulative Residual Impact - Severe</td><td></td></tr>
<tr><td>e)</td><td>Obligations : Necessary, directly relevant, fair & reasonable</td><td></td></tr>
<tr><td colspan="3">MfS</td></tr>
<tr><td>f)</td><td><u>Review of Existing Conditions</u></td><td rowspan="6"></td></tr>
<tr><td>g)</td><td>Location</td></tr>
<tr><td>h)</td><td>Speed</td></tr>
<tr><td>i)</td><td>Accidents</td></tr>
<tr><td>j)</td><td>Capacity – queues</td></tr>
<tr><td>k)</td><td>Parking</td></tr>
<tr><td><u>l)</u></td><td><u>Acceptability of Proposal</u></td><td rowspan="5"></td></tr>
<tr><td>m)</td><td>Layout (alignments, widths, radii)</td></tr>
<tr><td>n)</td><td>Turning / Swept Paths</td></tr>
<tr><td>o)</td><td>Parking</td></tr>
<tr><td>p)</td><td>Visibility
<table>
<tr><td>Speed (mph)</td><td>20</td><td>30</td><td>40</td><td>50</td><td>60</td></tr>
<tr><td>y distance (m)</td><td>25</td><td>43</td><td>65</td><td>92</td><td>124</td></tr>
</table></td></tr>
<tr><td>q)</td><td>Mitigation</td></tr>
<tr><td>r)</td><td>Highways to be adopted:
Pervious paving proposed then CBR > 3%</td><td></td></tr>
</table>

DRAINAGE STRATEGY REQUIREMENTS (DS)

Note:

1. The drainage strategy should set out and review existing local sources drainage measures on, and off site (i.e. areas surrounding and impacted by development of the site).
2. It should assess and quantify the drainage and flood impact of the proposed development both on and off site taking climate change into account.
3. It should expand the FRA or FRS with local sources drainage and management proposals, and justify their effectiveness for the lifetime of the development.
4. Priority should be given to using Sustainable Drainage Systems (SuDS).
5. In addition, the DS should outline proposed plans for local sources infrastructure ownership, adoption and maintenance.
6. The tables below show necessary information relating to local sources drainage which is to be provided in the DS, & be considered & accepted by HFA.
7. Detailed hydraulic calculations for highway drainage purposes should be provided in the **"Level 3" Whole Site Drainage Strategy &/or Whole Site Drainage Design Proposals.**
8. Need to consider a pyramid approach to the amount of detail required at each Level (i.e. lesser detail at "Level 1" & greater detail at "Level 3".
9. The amount of detail required for each specific DS will vary & be dependent on the scale & nature of the flood risk to & from the development & local sources drainage complexity.
10. See further advice in the National Planning Practice Guidance (NPPG) "Reducing the causes & impacts of flooding", SuDS Manual (C753) Section 7.5.7 & Appendix B.

"Level 1" Concept Proposals for Whole Site Highways, SuDS Scheme Design Refer also to SuDS Manual (C753), Appendix B, Table B.1		
Specific information needs to be provided as listed below:		Reviewed & accepted
	Technical validation check to cover essential items a) to f) below:	
a)	Natural & Artificial Drainage Catchment Plan showing land contours, topography and watercourses both surrounding and impacting the site.	
b)	Site Location Plan showing existing use of site, supported by recent photographs.	
c)	Existing site layout plan showing overall topography (ground level contours) across the site, the position of roads, access points, footpaths, road drains, watercourses and any other flood risk or surface water drainage features that need to be taken into account.	
d)	Concept drawings, of the proposed development layout (or layout options), showing the location of roads and sustainable drainage features (including water quality measures), plus any potential flood risk protection features that may be required.	
e)	Outline sizing of site layout areas/zones to confirm sufficient area for SuDS allowed, & initial thoughts on SuDS adoption & maintenance responsibilities.	
f)	Is the development site located within an Internal Drainage District (IDB) or within an IDB Extended Area & if so which one?	

"Level 2" Drainage Strategy Requirements AS PART OF THE Outline Whole Site Development Layout Plans for Highway & SuDS Scheme Design Proposals

Refer also to SuDS Manual (C753), Appendix B, Table B.2, SuDS Manual (C753), Appendix B, Table B.4 - Scheme Design Assessment Checklists; CIRIA RP992/19 - Infiltration assessment Checklist - to assist the geotechnical summary.

Specific information needs to be provided as listed below:		Reviewed & accepted
	Technical validation check to cover essential items a) to o) below:	
a)	Review Level1 information provided.	
b)	"Level 2" Outline Topographic Survey showing site location and type of development (SEE SUPPORT INFORMATION).	
c)	Outline drawings of proposed development, preliminary layout of surface water drainage infrastructure and landscaping.	
d)	Reference to planning conditions, reserved matters, and to the FRA.	
e)	Existing on site and relevant off site features including geology & desktop ground information (SEE DETAILED REQUIREMENTS BELOW in "Level 2" Desktop Ground Investigation Information checklist.)	
f)	Provide groundwater levels and location of, and impacts on, any Surface Water Safeguard Zones, Groundwater Safeguard Zones, Water Protection Zones, and/or Groundwater Nitrate Vulnerable Zones.	
g)	Summary of the hydrology including descriptions of existing drainage assets and features, and ownership of existing features and their condition and performance.	
h)	Summary of existing and drainage related flood risks, including surface water, discharges, existing flood flow paths, groundwater and other sources.	
i)	Summary of greenfield & brownfield runoff rate calculations;	
j)	Geotechnical factual & interpretative reports, including infiltration potential evidence and soil type for SPR calculations; (SEE DETAILED REQUIREMENTS BELOW in "Level 2" Desktop Ground Investigation Information checklist.)	
k)	Outline sustainable drainage (SuDS) design proposals – if not SuDS then an explanation why.	
l)	Summary of existing and proposed impermeable and permeable areas.	
m)	"Level 2" Outline Whole Site Drainage Proposals (i.e. Summary of surface water storage calculations, infiltration calculations & preliminary hydraulic calculations) - (SEE SUPPORT MATERIAL).	
n)	Details of current and future ownership of surface water drainage assets, adoption and future maintenance proposals. (SEE SUPPORT CHECKLIST.)	
o)	Outline of need for drainage related flood risk mitigation measures, stating their location, type and features.	
In addition, the remaining items below should be considered by the Developer as "Good Practice".		
p)	Summary of amenity and biodiversity value and proposals to maintain or enhance where possible.	
q)	Outline Water Quality Treatment Strategy (SEE SUPPORT CHECKLIST).	
r)	Avoiding duplication with the above & where appropriate, also provide further drainage design documentation suggested in the SuDS Manual (C753), Appendix B, Table B.2.	

"Level 3" Drainage Strategy Requirements AS PART OF THE Detailed Whole Site Development Layout Plans for Highway & SuDS Scheme Design Proposals

Refer also to SuDS Manual (C753), Appendix B, Table B.3, SuDS Manual (C753), Appendix B, Table B.4 - Scheme Design Assessment Checklists; SuDS Manual (C753), Appendix B, Section B.5 - SuDS Components Design Checklists; CIRIA RP992/19 - Infiltration assessment Checklist - to assist the geotechnical summary.

Specific information needs to be provided as listed below:		Reviewed & accepted
	Technical validation check to cover essential items a) to o) below:	
a)	Review "Level 1" & "Level 2" information provided.	
b)	"Level 3" Detailed Topographic Survey showing site location and type of development. (SEE SUPPORT CHECKLIST.)	
c)	Drawings of proposed development, layout of surface water drainage infrastructure and landscaping.	
d)	Reference to planning conditions, reserved matters, and to the FRA or FRS.	
e)	Existing on site and relevant off site features including topography and geology. (SEE DETAILED REQUIREMENTS BELOW in "Level 3" Detailed Geotechnical Interpretive Report checklist.)	
f)	Provide groundwater levels and location of, and impacts on, any Surface Water Safeguard Zones, Groundwater Safeguard Zones, Water Protection Zones, and/or Groundwater Nitrate Vulnerable Zones.	
g)	Detailed hydrology including descriptions of existing drainage assets and features, and ownership of existing features and their condition and performance.	
h)	Details of existing and drainage related flood risks, including surface water, discharges, existing flood flow paths, groundwater and other sources.	
i)	Geotechnical factual & interpretative reports, including infiltration potential evidence and soil type for SPR calculations. (SEE DETAILED REQUIREMENTS BELOW in "Level 3" Detailed Geotechnical Interpretive Report checklist.)	
j)	Detailed greenfield & brownfield runoff rate calculations.	
k)	Detailed sustainable drainage (SuDS) design proposals – if not SuDS then an explanation why.	
l)	Details of existing and proposed impermeable and permeable areas;	
m)	"Level 3" Detailed Whole Site Drainage Proposals (i.e. Detailed surface water storage calculations, infiltration calculations, outfalls & detailed hydraulic calculations all in accordance with the hierarchy of drainage options).- (SEE SUPPORT INFORMATION.)	
n)	Details of current and future ownership of surface water drainage assets, adoption and future maintenance proposals. (SEE SUPPORT INFORMATION.)	
o)	Details of need for & proposed drainage related flood risk mitigation measures, stating their location, type and features.	
In addition, the remaining items below should be considered by the Developer as "Good Practice".		
p)	Details of amenity and biodiversity value and proposals to maintain or enhance where possible.	
q)	Detailed Water Quality Treatment Strategy (SEE SUPPORT INFORMATION).	
r)	Avoiding duplication with the above & as appropriate, also provide	

	drainage design documentation suggested in the SuDS Manual (C753), Appendix B, Table B.3.	

Ground Investigation (GI) & Geotechnical Report (GR)

"Level 2" Desktop* Ground Investigation Information Requirements AS PART OF THE "Level 2" Outline Whole Site Drainage Strategy, and Outline Whole Site Development Layout Plans for Highway & SuDS Scheme Design Proposals Preferable to have information based on the BGS Infiltration SuDS GeoReport as shown below ***Except for e) below.**		
Purpose: To show (in outline and in context with the development as a whole), that the existing and future ground structure and conditions are appropriate and sustainable for the highway and SuDS scheme proposed. Information that needs to be provided includes:		Reviewed & accepted
For Sustainable Drainage: (Refer also to the British Geological Survey Maps)		
	Technical validation check to cover essential items a) to e) below:	
a)	Significant constraints (incl. soluble rocks, landslides, shallow mining, shallow groundwater, made ground).	
b)	Drainage potential (incl. depth to water table, permeability of superficial deposits, thickness of superficial deposits, permeability of bedrock, presence of floodplains). **Critical to consider infiltration, groundwater table, greenfield run-off & surface water storage as necessary at this stage.**	
c)	Ground stability (incl. soluble rocks, landslides, shallow mining, running sands, swelling clays, compressible ground, collapsible ground).	
d)	Geological maps (incl. artificial deposits, superficial deposits, bedrock).	
e)	Where pervious pavements are proposed in certain soil types, soaked CBRs are required - seek advice where necessary. "Rule of Thumb" estimation of infiltration potential support information on DM version ONLY.	

"Level 3" Detailed Geotechnical Interpretive Report Requirements AS PART OF THE "Level 3" Whole Site Drainage Strategy, and Detailed Whole Site Development Layout Plans for Highway & SuDS Scheme Design Proposals Refer to CIRIA RP992/19 - Infiltration assessment Checklist - to assist the geotechnical summary.		
Purpose: To show (in detail and in context with the development as a whole), that the existing and future ground structure and conditions are appropriate and sustainable for the highway and SuDS scheme proposed. Information that needs to be provided includes:		Reviewed & accepted
For Sustainable Drainage: (Refer also to the British Geological Survey Maps)		
	Technical validation check to cover essential items a) to f) below:	

a)	Build on Desktop Ground Investigation.	
b)	Detailed infiltration assessment (incl. evidence soil types & infiltration coefficients) i.e. BRE Digest 365	
c)	Where possible, detailed evidence of groundwater table levels over recent 12 month period or other validated evidence.	
d)	Where pervious pavements are proposed in certain soil types, soaked CBRs are required - seek advice where necessary. . “Rule of Thumb” estimation of infiltration potential support information on DM version ONLY.	

DM Technical Validation Checklists for Highways, a Flood Risk Statement (FRS), Drainage Design (DD), Ground Investigation (GI) & Geotechnical Report (GR)

Minor "A" Development

LCC requests that SuDS to be considered where appropriate for all developments

Minor "A" Development means all non Major development involving any one or more of the following:

(a) the provision of dwelling houses where —

(i) the number of dwelling houses to be provided is between 6 and 9; or

(ii) the development is to be carried out on a site having an area of less than 0.5 hectares and it is not known whether the development falls within sub-paragraph (b)(i);

(b) the provision of a building or buildings where the floor space to be created by the development is less than 1,000 square metres; or

(c) development carried out on a site having an area of less than 1 hectare or more;

It is the responsibility of local planning authorities to consult LCC HFA on the management of surface water and using conditions and/or obligations, to deliver appropriate sustainable drainage through the planning process. This includes securing clear arrangements for ongoing maintenance of drainage assets for the lifetime of the development.

Application Number:	**LPA & Ward:**
LPA Case officer:	**LCC HFA Case officer:**

NOTES & COMMENTS

(including from Site Visits)

Minor "A" Development Consultation Requirements for Highways, Flood Risk, SuDS & SW Drainage

Essential information (in italics) required at each planning stage or "Object" to the Planning Application on the grounds of "lack of sufficient information provided".

Notes:	Reviewed & accepted
First HFA Contact & Pre Planning (LEVEL 1 - Concept): • **HFA Planning Advice Form;** • ***Level 1 FRS*; and** • ***Conceptual scheme design (incl. DD).***	
Outline Planning Permission (LEVEL 2 - Outline): • ***Highways Information*** • ***Level 2 FRS*** *(if risk from local sources exists);* • ***Level 2 Ground Investigation*** *(i.e. infiltration, groundwater, greenfield run-off & storage volume);* • ***Level 2 Outline Whole Site DD AS PART OF Level 2 Outline Whole Site Development Layout Plans, Highways, SuDS & Flood Risk Scheme Design proposals;*** • **Travel Statement** (depending on specific development content) Note: For further information on the requirements for a TS, please refer to the HFA Development Design Approach (DDA)..	
Reserved Matters & Full Planning Permission (LEVEL 3 - Detailed): • ***Highways Information*** *(If not already provided at Outline Planning)* • ***Level 3 FRS*** *(if risk from local sources exists);* • ***Level 3 Detailed Geotechnical Interpretive Report*** *(i.e. infiltration, groundwater, greenfield run-off & storage volume);* • ***Level 3 Detailed Whole Site DD AS PART OF Level 3 Detailed Whole Site Development Layout Plans, Highways, SuDS & Flood Risk Scheme Design proposals*** • **Detailed whole site Landscape Plan;** • **Whole site Development Construction Management Plan.** If not already provided at Outline Planning then: • ***Travel Statement (TS)*** *(depending on specific development content).* Note: If no Outline Application is made, then the Outline Planning requirements above should be also provided. For further information on the requirements for a TS, please refer to the HFA Development Design Approach (DDA)..	

HIGHWAYS INFORMATION

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<tr><td>f)</td><td><u>Review of Existing Conditions</u></td><td rowspan="6"></td></tr>
<tr><td>g)</td><td>Location</td></tr>
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</table>

FLOOD RISK ANALYSIS - Flood Risk Statement (FRS)

Note:

1. **Whilst a STATEMENT of flood risk is less detailed than an Assessment it has the same overall objectives as outlined in NPPF Planning Practice Guidance Para 30. It should also follow the same overall principles mentioned above and provide evidence that key flood risk factors have been considered. Where necessary, flood risk mitigation measures should be proposed to ensure that the development will be safe for its lifetime, taking climate change into account.**
2. The tables below show necessary information relating to local sources of flood risk which is to be provided in the FRS, & be considered & accepted by HFA.
3. Strategic issues & NON local sources of flood risk should be considered by EA.
4. Hydraulic calculations for flood risk purposes are necessary in "Level 3" Flood Risk Statements.
5. Hydraulic calculations for highway drainage purposes should be provided in the **Whole Site Drainage Design Proposals.**
6. Need to consider a pyramid approach to the amount of detail required at each Level (i.e. lesser detail at "Level 1" & greater detail at "Level 3".
7. The amount of detail required for each specific FRS will vary & be dependent on the scale & nature of the flood risk to & from the development.
8. See further advice in National Planning Practice Guidance (NPPG), Development & Flood Risk Guidance for the Construction Industry - (Ciria C624) and FRA Guidance For New Development: Phase 2 FD2320/TR2 (web search for pdf doc).

"Level 1" Screening Study Flood Risk Statement Requirements (Ciria C624)		
The objectives of the "Level 1" FRS process as part of a tiered approach are to: • Develop a joint understanding of the potential flood risk to a development site; and • HFA, Developer & the LPA to agree what aspects of local sources of flood risk need to be addressed in a more detailed flood risk assessment. Specific questions etc. need to be answered and include those listed below:		Reviewed & accepted
	Technical validation check to cover essential items a) to f) below:	
a)	What type of development is proposed (e.g., new development, an extension to existing development, a change of use etc.) and is it considered to be Major, Minor "A" or Minor "B" development?	
b)	What is its flood risk vulnerability classification?	
c)	Which Surface Water Flood Zone the site located in i.e. "High", "Medium", "Low" or "Very Low".	
d)	Is the development site, or part of the development site, identified as being at risk of flooding from surface water &/or groundwater sources within available documentation?	
e)	Are the LPA / HFA / EA aware of any existing, historical or potential flooding problems that may affect the site? (For HFA refer to the Sec.19 Flood Investigations information.)	
f)	Is the development site located within an Internal Drainage District (IDB) or within an IDB Extended Area & if so which one?	
In addition, the remaining items below should be considered by the Developer as "Good Practice".		

f)	Is the development site located within 10m of a flood or drainage structure? (Refer to the HFA Flood & Drainage Asset Register & Map for further information)	
g)	Is it also in a EA Flood Zone & if so, which one? (As a first step, check the Flood Map for Planning (Rivers and Sea) on the Environment Agency's web site).	
h)	If there is an existing property on, or next to the site at the same internal threshold level.	
i)	Do the physical characteristics of the site suggest that it may be prone to flooding?	
j)	Is the development located within a natural or artificial hollow, or at the base of a valley or at the bottom of a hill slope?	
k)	Does examination of historical maps indicate any likelihood of flood risk at the site?	
l)	Do the names of surrounding roads, areas or houses suggest the possibility of seasonal or historical flooding?	
m)	Is the site likely to involve excavation / construction below existing ground levels (excluding foundations)?	
n)	Is the land use upslope of the site such that the generation of overland flow may be encouraged, and can water from this area flow onto the site?	
o)	Are there any artificial drainage systems on or next to the site, at the same level, or upslope of, the site?	
p)	Is the development site located upstream of a culvert which may be prone to blockage?	
q)	Is the development site next to or downstream/down-slope of a canal?	

"Level 2" Scoping Study
Flood Risk Statement Requirements

(Ciria C624)

The objectives of the "Level 2" FRS process as part of a tiered approach are listed below:		Reviewed & accepted
	Technical validation check to cover essential items a) to e) below:	
a)	Review Level 1 FRS & re-state content where needed to complete scoping exercise.	
b)	Develop an understanding of natural flow paths (above & below ground level), & the mechanisms of flooding at the site (including outline topographic survey – (SEE SUPPORT INFORMATION).	
c)	Confirm whether the site is in a "High", "Medium", "Low" or "Very Low" surface water flood risk zone.	
d)	Produce a preliminary qualitative assessment of the potential impact to the site & downstream of, and constraints to, the proposed development.	
e)	Priority should be given to using Sustainable Drainage Systems (SuDS).	
In addition, the remaining items below should be considered by the Developer as "Good Practice".		
f)	Identify available data.	
g)	Develop an understanding of the potential development design that may be employed at the site.	

"Level 3" Detailed Study
Flood Risk Statement Requirements

	(NPPF PPG Para 068)	
A Level 3 FRS should be undertaken to such a level of detail that an outline design/master plan can be presented to the HFA and LPA for consideration. Specific questions etc need to be answered and include those listed below:		Reviewed & accepted
	Technical validation check to cover essential items a) to j) below:	
a)	Review of Level 1 and 2 FRS & re-consider content where applicable.	
b)	Confirm the type of development proposed (e.g., new development, an extension to existing development, a change of use etc.) and where will it be located?	
c)	Confirm the flood risk vulnerability classification	
d)	For each identified source, can you describe how flooding would occur, with reference to any historic records where these are available? E.g. Sec.19 Flood Investigations & seek advice.	
e)	What are the existing surface water drainage arrangements for the site as provided in the **Detailed Whole Site Drainage Design Proposals?**	
f)	Confirm which EA Flood Zone the site is within? (Check the Flood Map for Planning (Rivers and Sea) on the Environment Agency's web site).	
g)	Confirm the probability of the site flooding, taking account of the maps of flood risk from rivers and the sea and from surface water, on the Environment Agency's web site, and any further flood risk information.	
h)	The existing rates and volumes of surface water run-off generated by the site, & assessment of the suitability of the receiving watercourse?	
i)	How is flood risk at the site likely to be affected by climate change? Further information on climate change and development and flood risk is available in the NPPF PG.	
j)	Assessment of: • the proposed impacts of the development; • how will the site/building be protected from flooding; & • how you will ensure that your proposed development and the measures to protect your site from flooding will not increase flood risk elsewhere. All including the potential impacts of climate change over the development's lifetime as provided in the **Detailed Whole Site Development Layout Plans**, **Highways, SuDS & Flood Risk Scheme Design Proposals.**	
In addition, the remaining items below should be considered by the Developer as "Good Practice".		
k)	Modelling where necessary to define the existing flood hazard (e.g. what sources of flooding could affect the site?), including climate change over the lifetime of the development, (including detailed topographic survey – (SEE SUPPORT INFORMATION).	
l)	Are there any opportunities offered by the development to reduce flood risk elsewhere?	
m)	What flood-related risks will remain after you have implemented the measures to protect the site from flooding, & how will flood risk design exceedance flows be routed away from property?	
n)	Sensitivity testing to demonstrate that the estimates of flood risk to, & arising from, the site are not overly dependent on the assumed model parameters.	
o)	How, and by whom, will these risks be managed over the lifetime of the development? (e.g., flood warning and evacuation procedures).	

DRAINAGE DETAIL REQUIREMENTS (DD)

Note:

1. The drainage detail should set out and review existing local sources drainage measures on, and off site (i.e. areas surrounding and impacted by development of the site).
2. It should assess and quantify the drainage and flood impact of the proposed development both on and off site taking climate change into account.
3. It should expand the FRS with local sources drainage and management proposals, and justify their effectiveness for the lifetime of the development.
4. Priority should be given to using Sustainable Drainage Systems (SuDS).
5. In addition, the DD should outline proposed plans for local sources infrastructure ownership, adoption and maintenance.
6. The tables below show necessary information relating to local sources drainage which is to be provided in the DD, & be considered & accepted by HFA.
7. Detailed hydraulic calculations for highway drainage purposes should be provided in the **"Level 3" Whole Site Drainage Design Proposals.**
8. Need to consider a pyramid approach to the amount of detail required at each Level (i.e. lesser detail at "Level 1" & greater detail at "Level 3".
9. The amount of detail required for each specific DD will vary & be dependent on the scale & nature of the flood risk to & from the development & local sources drainage complexity.
10. See further advice in the National Planning Practice Guidance (NPPG) "Reducing the causes & impacts of flooding", SuDS Manual (C753) Section 7.5.7 & Appendix B, Development & Flood Risk Guidance for the Construction Industry - (Ciria C624).

"Level 1" Concept Proposals for Whole Site Highways, SuDS / SW Drainage & Flood Risk Scheme Design

Refer also to SuDS Manual (C753), Appendix B, Table B.1

Specific information needs to be provided as listed below:		Reviewed & accepted
	Technical validation check to cover essential items a) to f) below:	
a)	Natural & Artificial Drainage Catchment Plan showing land contours, topography and watercourses both surrounding and impacting the site.	
b)	Site Location Plan showing existing use of site, supported by recent photographs.	
c)	Existing site layout plan showing overall topography (ground level contours) across the site, the position of roads, access points, footpaths, road drains, watercourses and any other flood risk or surface water drainage features that need to be taken into account.	
d)	Concept drawings, of the proposed development layout (or layout options), showing the location of roads and sustainable drainage features (including water quality measures), plus any potential flood risk protection features that may be required.	
e)	Outline sizing of site layout areas/zones to confirm sufficient area for SuDS allowed, & initial thoughts on SuDS adoption & maintenance responsibilities.	
f)	Is the development site located within an Internal Drainage District	

	(IDB) or within an IDB Extended Area & if so which one?	

"Level 2" Drainage Detail Requirements AS PART OF THE Outline Whole Site Development Layout Plans, Highway, SuDS / SW Drainage & Flood Risk Scheme Design Proposals

Refer also to SuDS Manual (C753), Appendix B, Table B.2, SuDS Manual (C753), Appendix B, Table B.4 - Scheme Design Assessment Checklists; CIRIA RP992/19 - Infiltration assessment Checklist - to assist the geotechnical summary.

Specific information needs to be provided as listed below:		Reviewed & accepted
	Technical validation check to cover essential items a) to o) below:	
a)	Review Level1 information provided.	
b)	"Level 2" Outline Topographic Survey showing site location and type of development (SEE SUPPORT INFORMATION).	
c)	Outline drawings of proposed development, preliminary layout of surface water drainage infrastructure and landscaping.	
d)	Reference to planning conditions, reserved matters, and to the FRA.	
e)	Existing on site and relevant off site features including geology & desktop ground information (SEE DETAILED REQUIREMENTS BELOW).	
f)	Provide groundwater levels and location of, and impacts on, any Surface Water Safeguard Zones, Groundwater Safeguard Zones, Water Protection Zones, and/or Groundwater Nitrate Vulnerable Zones.	
g)	Summary of the hydrology including descriptions of existing drainage assets and features, and ownership of existing features and their condition and performance.	
h)	Summary of existing and drainage related flood risks, including surface water, discharges, existing flood flow paths, groundwater and other sources.	
i)	Summary of greenfield & brownfield runoff rate calculations;	
j)	Geotechnical factual & interpretative reports, including infiltration potential evidence and soil type for SPR calculations; (SEE DETAILED REQUIREMENTS BELOW).	
k)	Outline sustainable drainage (SuDS) design proposals – if not SuDS then an explanation why.	
l)	Summary of existing and proposed impermeable and permeable areas.	
m)	"Level 2" Outline Whole Site Drainage Proposals (i.e. Summary of surface water storage calculations, infiltration calculations & preliminary hydraulic calculations) - (SEE SUPPORT INFORMATION).	
n)	Details of current and future ownership of surface water drainage assets, adoption and future maintenance proposals. (SEE SUPPORT INFORMATION.)	
o)	Outline of need for drainage related flood risk mitigation measures, stating their location, type and features.	
In addition, the remaining items below should be considered by the Developer as "Good Practice".		
p)	Summary of amenity and biodiversity value and proposals to maintain or enhance where possible.	
q)	Outline Water Quality Treatment Strategy (SEE SUPPORT INFORMATION).	

r)	Avoiding duplication with the above & where appropriate, also provide further drainage design documentation suggested in the SuDS Manual (C753), Appendix B, Table B.2.	

"Level 3" Drainage Detail Requirements AS PART OF THE Detailed Whole Site Development Layout Plans, Highway, SuDS / SW Drainage & Flood Risk Scheme Design Proposals

Refer also to SuDS Manual (C753), Appendix B, Table B.3, SuDS Manual (C753), Appendix B, Table B.4 - Scheme Design Assessment Checklists; SuDS Manual (C753), Appendix B, Section B.5 - SuDS Components Design Checklists; CIRIA RP992/19 - Infiltration assessment Checklist - to assist the geotechnical summary.

Specific information needs to be provided as listed below:		Reviewed & accepted
	Technical validation check to cover essential items a) to o) below:	
a)	Review "Level 1" & "Level 2" information provided.	
b)	"Level 3" Detailed Topographic Survey showing site location and type of development. (SEE SUPPORT INFORMATION.)	
c)	Drawings of proposed development, layout of surface water drainage infrastructure and landscaping.	
d)	Reference to planning conditions, reserved matters, and to the FRA or FRS.	
e)	Existing on site and relevant off site features including topography and geology. (SEE DETAILED REQUIREMENTS BELOW.)	
f)	Provide groundwater levels and location of, and impacts on, any Surface Water Safeguard Zones, Groundwater Safeguard Zones, Water Protection Zones, and/or Groundwater Nitrate Vulnerable Zones.	
g)	Detailed hydrology including descriptions of existing drainage assets and features, and ownership of existing features and their condition and performance.	
h)	Details of existing and drainage related flood risks, including surface water, discharges, existing flood flow paths, groundwater and other sources.	
i)	Geotechnical factual & interpretative reports, including infiltration potential evidence and soil type for SPR calculations; (SEE DETAILED REQUIREMENTS BELOW).	
j)	Detailed greenfield & brownfield runoff rate calculations.	
k)	Detailed sustainable drainage (SuDS) design proposals – if not SuDS then an explanation why.	
l)	Details of existing and proposed impermeable and permeable areas;	
m)	"Level 3" Detailed Whole Site Drainage Proposals (i.e. Detailed surface water storage calculations, infiltration calculations, outfalls & detailed hydraulic calculations all in accordance with the hierarchy of drainage options).- (SEE SUPPORT INFORMATION.)	
n)	Details of current and future ownership of surface water drainage assets, adoption and future maintenance proposals. (SEE SUPPORT INFORMATION.)	
o)	Details of need for & proposed drainage related flood risk mitigation measures, stating their location, type and features.	
In addition the remaining items below should be considered by the Developer as "Good Practice".		
p)	Details of amenity and biodiversity value and proposals to maintain or	

	enhance where possible.	
q)	Detailed Water Quality Treatment Strategy (SEE SUPPORT INFORMATION).	
r)	Avoiding duplication with the above & as appropriate, also provide drainage design documentation suggested in the SuDS Manual (C753), Appendix B, Table B.3.	

Ground Investigation (GI) & Geotechnical Report (GR)

"Level 2" Desktop* Ground Investigation Information Requirements AS PART OF THE "Level 2" Outline Whole Site Drainage Detail, and Outline Whole Site Development Layout Plans, Highway, SuDS / SW Drainage & Flood Risk Scheme Design Proposals ***Except for e) below.** Preferable to have information based on the BGS Infiltration SuDS GeoReport as shown below		
Purpose: To show (in outline and in context with the development as a whole), that the existing and future ground structure and conditions are appropriate and sustainable for the highway and SuDS / SW drainage scheme proposed. Information that needs to be provided includes:		Reviewed & accepted
For Sustainable Drainage: (Refer also to the British Geological Survey Maps)		
	Technical validation check to cover essential items a) to e) below:	
a)	Significant constraints (incl. soluble rocks, landslides, shallow mining, shallow groundwater, made ground).	
b)	Drainage potential (incl. depth to water table, permeability of superficial deposits, thickness of superficial deposits, permeability of bedrock, presence of floodplains). **Critical to consider infiltration, groundwater table, greenfield run-off & surface water storage as necessary at this stage.**	
c)	Ground stability (incl. soluble rocks, landslides, shallow mining, running sands, swelling clays, compressible ground, collapsible ground).	
d)	Geological maps (incl. artificial deposits, superficial deposits, bedrock).	
e)	Where pervious pavements are proposed in certain soil types, soaked CBRs are required - seek advice where necessary. "Rule of Thumb" estimation of infiltration potential support information on DM version ONLY.	

"Level 3" Detailed Geotechnical Interpretive Report Requirements AS PART OF THE "Level 3" Whole Site Drainage Detail, and Detailed Whole Site Development Layout Plans, Highway, SuDS / SW Drainage & Flood Risk Scheme Design Proposals Refer to CIRIA RP992/19 - Infiltration assessment Checklist - to assist the geotechnical summary.	
Purpose: To show (in detail and in context with the development as a whole), that the existing and future ground structure and conditions are appropriate and sustainable for the highway and SuDS / SW drainage scheme proposed. Information that needs to be provided includes:	Reviewed & accepted
For Sustainable Drainage: (Refer also to the British Geological Survey Maps)	

	Technical validation check to cover essential items a) to d) below:	
a)	Build on Desktop Ground Investigation.	
b)	Detailed infiltration assessment (incl. evidence soil types & infiltration coefficients) i.e. BRE Digest 365	
c)	Where possible, detailed evidence of groundwater table levels over recent 12 month period or other validated evidence.	
d)	Where pervious pavements are proposed in certain soil types, soaked CBRs are required - seek advice where necessary. . “Rule of Thumb” estimation of infiltration potential support information on DM version ONLY.	

DM Technical Validation Checklists for Highways, a Drainage Design (DD), Ground Investigation (GI) & Geotechnical Report (GR)

Minor "A" Development

LCC requests that SuDS to be considered where appropriate for all developments

Minor "A" Development means all non Major development involving any one or more of the following:

(a) the provision of dwelling houses where —

(i) the number of dwelling houses to be provided is between 6 and 9; or

(ii) the development is to be carried out on a site having an area of less than 0.5 hectares and it is not known whether the development falls within sub-paragraph (b)(i);

(b) the provision of a building or buildings where the floor space to be created by the development is less than 1,000 square metres; or

(c) development carried out on a site having an area of less than 1 hectare or more;

It is the responsibility of local planning authorities to consult LCC HFA on the management of surface water and using conditions and/or obligations, to deliver appropriate sustainable drainage through the planning process. This includes securing clear arrangements for ongoing maintenance of drainage assets for the lifetime of the development.

Application Number:	**LPA & Ward:**
LPA Case officer:	**LCC HFA Case officer:**

NOTES & COMMENTS

(including from Site Visits)

Minor "A" Development Consultation Requirements for Highways, SuDS & SW Drainage

Essential information (in italics) required at each planning stage or "Object" to the Planning Application on the grounds of "lack of sufficient information provided".

Notes:	Reviewed & accepted
First HFA Contact & Pre Planning (LEVEL 1 - Concept): • **HFA Planning Advice Form;** • ***Conceptual scheme design (incl. DD).***	
Outline Planning Permission (LEVEL 2 - Outline): • ***Highways Information*** • ***Level 2 Ground Investigation*** *(i.e. infiltration, groundwater, greenfield run-off & storage volume);* • ***Level 2 Outline Whole Site DD AS PART OF Level 2 Outline Whole Site Development Layout Plans for Highways & SuDS / SW Drainage Scheme Design proposals;*** • **Travel Statement** (depending on specific development content) Note: For further information on the requirements for a TS, please refer to the HFA Development Design Approach (DDA)..	
Reserved Matters & Full Planning Permission (LEVEL 3 - Detailed): • ***Highways Information*** *(If not already provided at Outline Planning)* • ***Level 3 Detailed Geotechnical Interpretive Report*** *(i.e. infiltration, groundwater, greenfield run-off & storage volume);* • ***Level 3 Detailed Whole Site DD AS PART OF Level 3 Detailed Whole Site Development Layout Plans for Highways & SuDS / SW Drainage Scheme Design proposals;*** • **Detailed whole site Landscape Plan;** • **Whole site Development Construction Management Plan.** If not already provided at Outline Planning then: • ***Travel Statement (TS)*** *(depending on specific development content).* Note: If no Outline Application is made, then the Outline Planning requirements above should be also provided. For further information on the requirements for a TS, please refer to the HFA Development Design Approach (DDA)..	

HIGHWAYS INFORMATION

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<tr><th colspan="2">Highways Technical Validation Checklist</th><th>Comments / Notes</th></tr>
<tr><td colspan="3">Technical validation check to cover essential items a) to r) below:</td></tr>
<tr><td colspan="3">NPPF</td></tr>
<tr><td>a)</td><td>Significant Movements – TA Required
(Typically >500 vpd or 80 dwellings)</td><td></td></tr>
<tr><td>b)</td><td>Sustainable – location / connectivity</td><td></td></tr>
<tr><td>c)</td><td>Safe & suitable access for all users</td><td></td></tr>
<tr><td>d)</td><td>Cumulative Residual Impact - Severe</td><td></td></tr>
<tr><td>e)</td><td>Obligations : Necessary, directly relevant, fair & reasonable</td><td></td></tr>
<tr><td colspan="3">MfS</td></tr>
<tr><td>f)</td><td><u>Review of Existing Conditions</u></td><td rowspan="6"></td></tr>
<tr><td>g)</td><td>Location</td></tr>
<tr><td>h)</td><td>Speed</td></tr>
<tr><td>i)</td><td>Accidents</td></tr>
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DRAINAGE DETAIL REQUIREMENTS (DD)

Note:

1. The drainage detail should set out and review existing local sources drainage measures on, and off site (i.e. areas surrounding and impacted by development of the site).
2. It should assess and quantify the drainage and flood impact of the proposed development both on and off site taking climate change into account.
3. It should expand the FRS with local sources drainage and management proposals, and justify their effectiveness for the lifetime of the development.
4. Priority should be given to using Sustainable Drainage Systems (SuDS).
5. In addition, the DD should outline proposed plans for local sources infrastructure ownership, adoption and maintenance.
6. The tables below show necessary information relating to local sources drainage which is to be provided in the DD, & be considered & accepted by HFA.
7. Detailed hydraulic calculations for highway drainage purposes should be provided in the **"Level 3" Whole Site Drainage Design Proposals.**
8. Need to consider a pyramid approach to the amount of detail required at each Level (i.e. lesser detail at "Level 1" & greater detail at "Level 3".
9. The amount of detail required for each specific DD will vary & be dependent on the scale & nature of the flood risk to & from the development & local sources drainage complexity.
10. See further advice in the National Planning Practice Guidance (NPPG) "Reducing the causes & impacts of flooding", SuDS Manual (C753) Section 7.5.7 & Appendix B.

"Level 1" Concept Proposals for Whole Site Highways & SuDS / SW Drainage Scheme Design Refer also to SuDS Manual (C753), Appendix B, Table B.1		
Specific information needs to be provided as listed below:		Reviewed & accepted
	Technical validation check to cover essential items a) to f) below:	
a)	Natural & Artificial Drainage Catchment Plan showing land contours, topography and watercourses both surrounding and impacting the site.	
b)	Site Location Plan showing existing use of site, supported by recent photographs.	
c)	Existing site layout plan showing overall topography (ground level contours) across the site, the position of roads, access points, footpaths, road drains, watercourses and any other flood risk or surface water drainage features that need to be taken into account.	
d)	Concept drawings, of the proposed development layout (or layout options), showing the location of roads and sustainable drainage features (including water quality measures), plus any potential flood risk protection features that may be required.	
e)	Outline sizing of site layout areas/zones to confirm sufficient area for SuDS allowed, & initial thoughts on SuDS adoption & maintenance responsibilities.	
f)	Is the development site located within an Internal Drainage District (IDB) or within an IDB Extended Area & if so which one?	

"Level 2" Drainage Detail Requirements AS PART OF THE Outline Whole Site Development Layout Plans for Highway & SuDS / SW Drainage Design Proposals

Refer also to SuDS Manual (C753), Appendix B, Table B.2, SuDS Manual (C753), Appendix B, Table B.4 - Scheme Design Assessment Checklists; CIRIA RP992/19 - Infiltration assessment Checklist - to assist the geotechnical summary.

Specific information needs to be provided as listed below:		Reviewed & accepted
	Technical validation check to cover essential items a) to o) below:	
a)	Review Level1 information provided.	
b)	"Level 2" Outline Topographic Survey showing site location and type of development (SEE SUPPORT INFORMATION).	
c)	Outline drawings of proposed development, preliminary layout of surface water drainage infrastructure and landscaping.	
d)	Reference to planning conditions, reserved matters, and to the FRA.	
e)	Existing on site and relevant off site features including geology & desktop ground information (SEE DETAILED REQUIREMENTS BELOW).	
f)	Provide groundwater levels and location of, and impacts on, any Surface Water Safeguard Zones, Groundwater Safeguard Zones, Water Protection Zones, and/or Groundwater Nitrate Vulnerable Zones.	
g)	Summary of the hydrology including descriptions of existing drainage assets and features, and ownership of existing features and their condition and performance.	
h)	Summary of existing and drainage related flood risks, including surface water, discharges, existing flood flow paths, groundwater and other sources.	
i)	Summary of greenfield & brownfield runoff rate calculations;	
j)	Geotechnical factual & interpretative reports, including infiltration potential evidence and soil type for SPR calculations; (SEE DETAILED REQUIREMENTS BELOW).	
k)	Outline sustainable drainage (SuDS) design proposals – if not SuDS then an explanation why.	
l)	Summary of existing and proposed impermeable and permeable areas.	
m)	"Level 2" Outline Whole Site Drainage Proposals (i.e. Summary of surface water storage calculations, infiltration calculations & preliminary hydraulic calculations) - (SEE SUPPORT INFORMATION).	
n)	Details of current and future ownership of surface water drainage assets, adoption and future maintenance proposals. (SEE SUPPORT INFORMATION.)	
o)	Outline of need for drainage related flood risk mitigation measures, stating their location, type and features.	
In addition, the remaining items below should be considered by the Developer as "Good Practice".		
p)	Summary of amenity and biodiversity value and proposals to maintain or enhance where possible.	
q)	Outline Water Quality Treatment Strategy (SEE SUPPORT INFORMATION).	
r)	Avoiding duplication with the above & where appropriate, also provide further drainage design documentation suggested in the SuDS Manual (C753), Appendix B, Table B.2.	

"Level 3" Drainage Detail Requirements AS PART OF THE Detailed Whole Site Development Layout Plans for Highway & SuDS / SW Drainage Design Proposals

Refer also to SuDS Manual (C753), Appendix B, Table B.3, SuDS Manual (C753), Appendix B, Table B.4 - Scheme Design Assessment Checklists; SuDS Manual (C753), Appendix B, Section B.5 - SuDS Components Design Checklists; CIRIA RP992/19 - Infiltration assessment Checklist - to assist the geotechnical summary.

Specific information needs to be provided as listed below:		Reviewed & accepted
	Technical validation check to cover essential items a) to o) below:	
a)	Review "Level 1" & "Level 2" information provided.	
b)	"Level 3" Detailed Topographic Survey showing site location and type of development. (SEE SUPPORT INFORMATION.)	
c)	Drawings of proposed development, layout of surface water drainage infrastructure and landscaping.	
d)	Reference to planning conditions, reserved matters, and to the FRA or FRS.	
e)	Existing on site and relevant off site features including topography and geology. (SEE DETAILED REQUIREMENTS BELOW.)	
f)	Provide groundwater levels and location of, and impacts on, any Surface Water Safeguard Zones, Groundwater Safeguard Zones, Water Protection Zones, and/or Groundwater Nitrate Vulnerable Zones.	
g)	Detailed hydrology including descriptions of existing drainage assets and features, and ownership of existing features and their condition and performance.	
h)	Details of existing and drainage related flood risks, including surface water, discharges, existing flood flow paths, groundwater and other sources.	
i)	Geotechnical factual & interpretative reports, including infiltration potential evidence and soil type for SPR calculations; (SEE DETAILED REQUIREMENTS BELOW).	
j)	Detailed greenfield & brownfield runoff rate calculations.	
k)	Detailed sustainable drainage (SuDS) design proposals – if not SuDS then an explanation why.	
l)	Details of existing and proposed impermeable and permeable areas;	
m)	"Level 3" Detailed Whole Site Drainage Proposals (i.e. Detailed surface water storage calculations, infiltration calculations, outfalls & detailed hydraulic calculations all in accordance with the hierarchy of drainage options).- (SEE SUPPORT INFORMATION.)	
n)	Details of current and future ownership of surface water drainage assets, adoption and future maintenance proposals. (SEE SUPPORT INFORMATION.)	
o)	Details of need for & proposed drainage related flood risk mitigation measures, stating their location, type and features.	
In addition, the remaining items below should be considered by the Developer as "Good Practice".		
p)	Details of amenity and biodiversity value and proposals to maintain or enhance where possible.	
q)	Detailed Water Quality Treatment Strategy (SEE SUPPORT INFORMATION).	
r)	Avoiding duplication with the above & as appropriate, also provide drainage design documentation suggested in the SuDS Manual (C753).	

	Appendix B, Table B.3.	

Ground Investigation (GI) & Geotechnical Report (GR)

"Level 2" Desktop* Ground Investigation Information Requirements AS PART OF THE "Level 2" Outline Whole Site Drainage Detail, and Outline Whole Site Development Layout Plans for Highway & SuDS / SW Drainage Scheme Design Proposals ***Except for e) below.** Preferable to have information based on the BGS Infiltration SuDS GeoReport as shown below		
Purpose: To show (in outline and in context with the development as a whole), that the existing and future ground structure and conditions are appropriate and sustainable for the highway and SuDS / SW drainage scheme proposed. Information that needs to be provided includes:		Reviewed & accepted
For Sustainable Drainage: (Refer also to the British Geological Survey Maps)		
	Technical validation check to cover essential items a) to e) below:	
a)	Significant constraints (incl. soluble rocks, landslides, shallow mining, shallow groundwater, made ground).	
b)	Drainage potential (incl. depth to water table, permeability of superficial deposits, thickness of superficial deposits, permeability of bedrock, presence of floodplains). **Critical to consider infiltration, groundwater table, greenfield run-off & surface water storage as necessary at this stage.**	
c)	Ground stability (incl. soluble rocks, landslides, shallow mining, running sands, swelling clays, compressible ground, collapsible ground).	
d)	Geological maps (incl. artificial deposits, superficial deposits, bedrock).	
e)	Where pervious pavements are proposed in certain soil types, soaked CBRs are required - seek advice where necessary. "Rule of Thumb" estimation of infiltration potential support information on DM version ONLY.	

"Level 3" Detailed Geotechnical Interpretive Report Requirements AS PART OF THE "Level 3" Whole Site Drainage Detail, and Detailed Whole Site Development Layout Plans for Highway & SuDS / SW Drainage Scheme Design Proposals Refer to CIRIA RP992/19 - Infiltration assessment Checklist - to assist the geotechnical summary.		
Purpose: To show (in detail and in context with the development as a whole), that the existing and future ground structure and conditions are appropriate and sustainable for the highway and SuDS / SW drainage scheme proposed. Information that needs to be provided includes:		Reviewed & accepted
For Sustainable Drainage: (Refer also to the British Geological Survey Maps)		
	Technical validation check to cover essential items a) to d) below:	
a)	Build on Desktop Ground Investigation.	
b)	Detailed infiltration assessment (incl. evidence soil types & infiltration	

	coefficients) i.e. BRE Digest 365	
c)	Where possible, detailed evidence of groundwater table levels over recent 12 month period or other validated evidence.	
d)	Where pervious pavements are proposed in certain soil types, soaked CBRs are required - seek advice where necessary. . "Rule of Thumb" estimation of infiltration potential support information on DM version ONLY.	

DM Technical Validation Checklists for Highways and a Flood Risk Statement (FRS)

Minor "B" Development

LCC requests that SuDS to be considered where appropriate for all developments

Minor "B" Development means all non Major & non Minor "A" development involving any one or more of the following:

(a) the provision of dwelling houses where —

(i) the number of dwelling houses to be provided is between 1 and 5; or

(ii) the development is to be carried out on a site having an area of less than 0.5 hectares and it is not known whether the development falls within sub-paragraph (b)(i);

(b) the provision of a building or buildings where the floor space to be created by the development is less than 1,000 square metres; or

(c) development carried out on a site having an area of less than 1 hectare or more;

It is the responsibility of local planning authorities to determine the management of surface water and using conditions and/or obligations, to deliver appropriate drainage through the planning process. This includes securing clear arrangements for ongoing maintenance of drainage assets for the lifetime of the development.

Application Number:	**LPA & Ward:**
LPA Case officer:	**LCC HFA Case officer:**

NOTES & COMMENTS

(including from Site Visits)

Minor "B" Development Consultation Requirements for Highways & Flood Risk

Essential information (in italics) required at each planning stage or "Object" to the Planning Application on the grounds of "lack of sufficient information provided".

Notes:	Reviewed & accepted
First HFA Contact & Pre Planning (LEVEL 1 - Concept): • **HFA Planning Advice Form**; ***and*** • ***Level 1 FRS***.	
Outline Planning Permission (LEVEL 2 - Outline): • ***Highways Information***; ***and*** • ***Level 2 FRS*** *(if risk from local sources exists)*.	
Reserved Matters & Full Planning Permission (LEVEL 3 - Detailed): • ***Highways Information***; ***and*** *(If not already provided at Outline Planning)* • ***Level 3 FRS*** *(if risk from local sources exists)*. Note: If no Outline Application is made, then the Outline Planning requirements above should be also provided.	

HIGHWAYS INFORMATION

<table>
<tr><th colspan="2">Highways Technical Validation Checklist</th><th>Comments / Notes</th></tr>
<tr><td colspan="3">Technical validation check to cover essential items a) to r) below:</td></tr>
<tr><td colspan="3">NPPF</td></tr>
<tr><td>a)</td><td>Significant Movements – TA Required
(Typically >500 vpd or 80 dwellings)</td><td></td></tr>
<tr><td>b)</td><td>Sustainable – location / connectivity</td><td></td></tr>
<tr><td>c)</td><td>Safe & suitable access for all users</td><td></td></tr>
<tr><td>d)</td><td>Cumulative Residual Impact - Severe</td><td></td></tr>
<tr><td>e)</td><td>Obligations : Necessary, directly relevant,
fair & reasonable</td><td></td></tr>
<tr><td colspan="3">MfS</td></tr>
<tr><td>f)</td><td><u>Review of Existing Conditions</u></td><td rowspan="6"></td></tr>
<tr><td>g)</td><td>Location</td></tr>
<tr><td>h)</td><td>Speed</td></tr>
<tr><td>i)</td><td>Accidents</td></tr>
<tr><td>j)</td><td>Capacity – queues</td></tr>
<tr><td>k)</td><td>Parking</td></tr>
<tr><td>l)</td><td><u>Acceptability of Proposal</u></td><td rowspan="5"></td></tr>
<tr><td>m)</td><td>Layout (alignments, widths, radii)</td></tr>
<tr><td>n)</td><td>Turning / Swept Paths</td></tr>
<tr><td>o)</td><td>Parking</td></tr>
<tr><td>p)</td><td>Visibility
<table>
<tr><td>Speed (mph)</td><td>20</td><td>30</td><td>40</td><td>50</td><td>60</td></tr>
<tr><td>y distance (m)</td><td>25</td><td>43</td><td>65</td><td>92</td><td>124</td></tr>
</table></td></tr>
<tr><td>q)</td><td>Mitigation</td></tr>
<tr><td>r)</td><td>Highways to be adopted:
Pervious paving proposed then CBR > 3%</td><td></td></tr>
</table>

FLOOD RISK ANALYSIS - Flood Risk Statement (FRS)

Note:

1. **Whilst a STATEMENT of flood risk is less detailed than an Assessment it has the same overall objectives as outlined in NPPF Planning Practice Guidance Para 30. It should also follow the same overall principles mentioned above and provide evidence that key flood risk factors have been considered. Where necessary, flood risk mitigation measures should be proposed to ensure that the development will be safe for its lifetime, taking climate change into account.**
2. The tables below show necessary information relating to local sources of flood risk which is to be provided in the FRS, & be considered & accepted by HFA.
3. Strategic issues & NON local sources of flood risk should be considered by EA.
4. Hydraulic calculations for flood risk purposes are necessary in "Level 3" Flood Risk Statements.
5. Need to consider a pyramid approach to the amount of detail required at each Level (i.e. lesser detail at "Level 1" & greater detail at "Level 3".
6. The amount of detail required for each specific FRS will vary & be dependent on the scale & nature of the flood risk to & from the development.
7. See further advice in National Planning Practice Guidance (NPPG), Development & Flood Risk Guidance for the Construction Industry - (Ciria C624) Appendix A2, and FRA Guidance For New Development: Phase 2 FD2320/TR2 (web search for pdf doc).

"Level 1" Screening Study Flood Risk Statement Requirements (Ciria C624)		
The objectives of the "Level 1" FRS process as part of a tiered approach are to: • Develop a joint understanding of the potential flood risk to a development site; and • HFA, Developer & the LPA to agree what aspects of local sources of flood risk need to be addressed in a more detailed flood risk assessment. Specific questions etc. need to be answered and include those listed below:		Reviewed & accepted
	Technical validation check to cover essential items a) to f) below:	
a)	What type of development is proposed (e.g., new development, an extension to existing development, a change of use etc.) and is it considered to be Major, Minor "A" or Minor "B" development?	
b)	What is its flood risk vulnerability classification?	
c)	Which Surface Water Flood Zone the site located in i.e. "High", "Medium", "Low" or "Very Low".	
d)	Is the development site, or part of the development site, identified as being at risk of flooding from surface water &/or groundwater sources within available documentation?	
e)	Are the LPA / HFA / EA aware of any existing, historical or potential flooding problems that may affect the site? (For HFA refer to the Sec.19 Flood Investigations information.)	
f)	Is the development site located within an Internal Drainage District (IDB) or within an IDB Extended Area & if so which one?	
In addition, the remaining items below should be considered by the Developer as "Good		

Practice".		
f)	Is the development site located within 10m of a flood or drainage structure? (Refer to the HFA Flood & Drainage Asset Register & Map for further information)	
g)	Is it also in a EA Flood Zone & if so, which one? (As a first step, check the Flood Map for Planning (Rivers and Sea) on the Environment Agency's web site).	
h)	If there is an existing property on, or next to the site at the same internal threshold level.	
i)	Do the physical characteristics of the site suggest that it may be prone to flooding?	
j)	Is the development located within a natural or artificial hollow, or at the base of a valley or at the bottom of a hill slope?	
k)	Does examination of historical maps indicate any likelihood of flood risk at the site?	
l)	Do the names of surrounding roads, areas or houses suggest the possibility of seasonal or historical flooding?	
m)	Is the site likely to involve excavation / construction below existing ground levels (excluding foundations)?	
n)	Is the land use upslope of the site such that the generation of overland flow may be encouraged, and can water from this area flow onto the site?	
o)	Are there any artificial drainage systems on or next to the site, at the same level, or upslope of, the site?	
p)	Is the development site located upstream of a culvert which may be prone to blockage?	
q)	Is the development site next to or downstream/down-slope of a canal?	

"Level 2" Scoping Study
Flood Risk Statement Requirements
(Ciria C624)

The objectives of the "Level 2" FRS process as part of a tiered approach are listed below:		Reviewed & accepted
	Technical validation check to cover essential items a) to e) below:	
a)	Review Level 1 FRS & re-state content where needed to complete scoping exercise.	
b)	Develop an understanding of natural flow paths (above & below ground level), & the mechanisms of flooding at the site (including outline topographic survey – (SEE SUPPORT INFORMATION).	
c)	Confirm whether the site is in a "High", "Medium", "Low" or "Very Low" surface water flood risk zone.	
d)	Produce a preliminary qualitative assessment of the potential impact to the site & downstream of, and constraints to, the proposed development.	
e)	Priority should be given to using Sustainable Drainage Systems (SuDS).	
In addition, the remaining items below should be considered by the Developer as "Good Practice".		
f)	Identify available data.	
g)	Develop an understanding of the potential development design that may be employed at the site.	

"Level 3" Detailed Study

Flood Risk Statement Requirements (NPPF PPG Para 068)		
A Level 3 FRS should be undertaken to such a level of detail that an outline design/master plan can be presented to the HFA and LPA for consideration. Specific questions etc need to be answered and include those listed below:		Reviewed & accepted
	Technical validation check to cover essential items a) to j) below:	
a)	Review of Level 1 and 2 FRS & re-consider content where applicable.	
b)	Confirm the type of development proposed (e.g., new development, an extension to existing development, a change of use etc.) and where will it be located?	
c)	Confirm the flood risk vulnerability classification	
d)	For each identified source, can you describe how flooding would occur, with reference to any historic records where these are available? E.g. Sec.19 Flood Investigations & seek advice.	
e)	What are the existing surface water drainage arrangements for the site?	
f)	Confirm which EA Flood Zone the site is within? (Check the Flood Map for Planning (Rivers and Sea) on the Environment Agency's web site).	
g)	Confirm the probability of the site flooding, taking account of the maps of flood risk from rivers and the sea and from surface water, on the Environment Agency's web site, and any further flood risk information.	
h)	The existing rates and volumes of surface water run-off generated by the site, & assessment of the suitability of the receiving watercourse?	
i)	How is flood risk at the site likely to be affected by climate change? Further information on climate change and development and flood risk is available in the NPPF PG.	
j)	Assessment of: • the proposed impacts of the development; • how will the site/building be protected from flooding; & • how you will ensure that your proposed development and the measures to protect your site from flooding will not increase flood risk elsewhere. All including the potential impacts of climate change over the development's lifetime, as provided in the **Detailed Whole Site Development Layout Plans**, **Highways, Surface Water Drainage & Flood Risk Scheme Design Proposals.**	
In addition, the remaining items below should be considered by the Developer as "Good Practice".		
k)	Modelling where necessary to define the existing flood hazard (e.g. what sources of flooding could affect the site?), including climate change over the lifetime of the development, (including detailed topographic survey – (SEE SUPPORT INFORMATION).	
l)	Are there any opportunities offered by the development to reduce flood risk elsewhere?	
m)	What flood-related risks will remain after you have implemented the measures to protect the site from flooding, & how will flood risk design exceedance flows be routed away from property?	
n)	Sensitivity testing to demonstrate that the estimates of flood risk to, & arising from, the site are not overly dependent on the assumed model parameters.	
o)	How, and by whom, will these risks be managed over the lifetime of the development? (e.g., flood warning and evacuation procedures).	

DM Technical Validation Checklists SUPPORT Information

DM Technical Validation Checklists SUPPORT information for Major, Minor “A” & Minor “B” development types as necessary:

- Topographic Survey;
- Whole Site Drainage;
- Surface Water Discharge Agreement;
- SuDS Scheme Maintenance;
- Water Quality Treatment;
- Landscape;
- Construction Management;
- Construction Method Statement; and
- Construction Phasing.

"Level 2" Outline Topographic Survey Requirements AS PART OF THE Outline Whole Site Drainage Strategy, and Outline Whole Site Development Layout Plans, Highway, SuDS & Flood Risk Scheme Design Proposals

Specific information needs to be provided as listed below:		Reviewed & accepted
a)	Roads, footpaths (incl. cross-sections).	
b)	Building footprints, permanent structures, building remains.	
c)	Vulnerability of development site & surrounding area.	
d)	Trees.	
e)	Boundary features.	
f)	Visible drainage information including significant pipes & culverts, manhole covers, gullies, inspection covers, outfalls, discharge points.	
g)	Visible utility service information including overhead cables, electric poles/pylons, telephone poles, service covers.	
h)	Top and bottom of embankments.	
i)	Watercourses including top and bottom of banks (incl. cross-sections).	
j)	Extent of ponds and lakes.	
k)	Spot levels taken at changes of gradient.	
l)	Contours drawn at suitable intervals depending on gradient of site.	

"Level 3" Detailed Topographic Survey Requirements AS PART OF THE Detailed Whole Site Drainage Strategy, and Detailed Whole Site Development Layout Plans, Highway, SuDS & Flood Risk Scheme Design Proposals

Specific information needs to be provided as listed below:		Reviewed & accepted
a)	Roads, top of kerbs, footpaths, changes in surface (incl. cross-sections).	
b)	Building footprints, permanent structures, building remains including projections, overhangs & basements.	
c)	Vulnerability of development site & surrounding area.	
d)	Individual trees, groups of trees, parks, extent of scrub, planting areas, gardens.	
e)	Boundary features including walls, fences, hedges.	
f)	Foul & surface water drainage information including manhole covers, gullies, inspection covers, pipe runs, outfalls, discharge points.	
g)	Visible & underground utility survey information including utility buildings & structure, cables, electric poles/pylons, telephone poles, service covers.	
h)	Top and bottom of embankments (incl. cross-sections).	
i)	Watercourses including top and bottom of banks, invert levels and water level (incl. cross-sections).	
j)	Extent of ponds and lakes (incl. cross-sections).	
k)	Spot levels taken at 10m spacing and at changes of gradient.	
l)	Contours drawn at suitable intervals depending on gradient of site (incl. cross-sections).	
m)	Void detection survey (upon request).	

"Level 2" Outline Whole Site Drainage Proposals Requirements (Including preliminary surface water storage calculations, infiltration calculations & hydraulic calculations) Refer also to SuDS Manual (C753), Appendix B, Table B.2

Purpose: To prevent the increased risk of flooding; to improve and protect water quality; to improve habitat and amenity; and to ensure the future maintenance of the sustainable drainage structures. Specific information needs to be provided as listed below:		Reviewed & accepted
a)	Justification for the method of discharge from the surface water/SuDS drainage network following the hierarchy of surface water disposal as per part 3.2.3 of the SuDS Manual (C753) and Part H of the Building regulations.	
b)	Where infiltration is proposed, a desktop study to prove infiltration potential of the surrounding soils.	
c)	Where offsite discharge is proposed, proposed runoff rate for the development based on greenfield runoff calculations including assessments of runoff rate and volumetric runoff.	
d)	Preliminary sizing calculations for proposed SuDS features based on discharge rate or approximate infiltration rates.	
e)	Preliminary layout drawings which prove the storage volumes can be provided within the site layout via appropriate SuDS features.	

"Level 3" Detailed Whole Site Drainage Proposals Requirements (Including preliminary surface water storage calculations, infiltration calculations & hydraulic calculations) Refer also to SuDS Manual (C753), Appendix B, Table B.2

Purpose: To prevent the increased risk of flooding; to improve and protect water quality; to improve habitat and amenity; and to ensure the future maintenance of the sustainable drainage structures. Specific information needs to be provided as listed below:		Reviewed & accepted
a)	Justification for the method of discharge from the surface water/SuDS drainage network following the hierarchy of surface water disposal as per part 3.2.3 of the SuDS Manual (C753) and Part H of the Building regulations.	
b)	Where infiltration is proposed, infiltration testing in accordance with BRE Digest 365 relative to the depth and location of proposed SuDS features.	
c)	Where offsite discharge is proposed, proposed runoff rate for the development based on greenfield runoff calculations including assessments of runoff rate and volumetric runoff.	
d)	Hydraulic calculations which demonstrate the performance of the designed system including critical storm durations for return periods inclusive of the 1 in 1 year, 1 in 2 year, 1 in 30 year, 1 in 100 year and 1 in 100 year return periods including an appropriate allowance for climate change.	
e)	Detailed layout drawings and plans of the drainage network which demonstrate how the drainage system will function as a holistic system.	

	Plans and details should include levels and dimensions of all proposed drainage infrastructure proposed for the development.	

"Level 3" Surface Water Discharge Agreements Requirements

Purpose: To secure a sustainable, long-term method of surface water disposal for the development.		Reviewed & accepted
a)	Signed letter of agreement (by the appropriate authority &/or the riparian owner) for the discharge of surface water into the receiving watercourse &/or surface water sewer.	

"Level 2" Outline Whole Site SuDS Scheme Maintenance Plan Requirements

Refer also to CIRIA RP992/21 - SuDS Scheme Maintenance Plan Checklist; CIRIA RP992/23 - SuDS Scheme Maintenance Plan Example; SuDS Maintenance and Adoption Options Fact Sheet; (SuDS) Manual - (CIRIA C753) Appendix B Para. 8.

Purpose: To show (in outline and in context with the development as a whole), how the SuDS scheme will be maintained over its design life, and who will have this responsibility. Information that needs to be provided includes:		Reviewed & accepted
a)	Outline information on how SuDS will be managed & maintained, & who will do it for the lifetime of the development. (Refer to Appendix A in the Development Design Guide.) Link req	
b)	Summary information on the various human, plant & materials resources needed & broad timescales as to when.	

"Level 3" Detailed Whole Site SuDS Scheme Maintenance Plan Requirements

Refer also to CIRIA RP992/21 - SuDS Scheme Maintenance Plan Checklist; CIRIA RP992/23 - SuDS Scheme Maintenance Plan Example; SuDS Maintenance and Adoption Options Fact Sheet; (SuDS) Manual - (CIRIA C753) Appendix B Para. 8.

Purpose: To show (in detail and in context with the development as a whole), how the SuDS scheme will be maintained over its design life, and who will have this responsibility. Information that needs to be provided includes:		Reviewed & accepted
a)	Detailed information on how SuDS will be managed & maintained, & who will do it for the lifetime of the development.	
b)	Detailed information on the various human, plant & materials resources needed & broad timescales as to when.	

"Level 2" Outline Water Quality Treatment Measures Requirements AS PART OF THE Outline Whole Site Drainage Strategy, and Outline Whole Site Development Layout Plans, Highway, SuDS & Flood Risk Scheme Design Proposals

Refer to (SuDS Manual (C753), Chapter 4, Table 4.3); Chapters 4, 26 & 27 - Water Quality & Pollution Prevention		
Purpose: To show (in outline and in context with the development as a whole), how the SuDS scheme will sustainably prevent the risk of pollution to land and water, and where possible, enhance water quality, water related amenity and biodiversity in the future. Information that needs to be provided includes:		Reviewed & accepted
a)	Have the minimum water quality management requirements been considered & are they able to be met?	
b)	Details of what SuDS components have been provided in series (SuDS train) to cleanse flow prior to point of discharge.	

"Level 3" Detailed Water Quality Treatment Measures Requirements AS PART OF THE Detailed Whole Site Drainage Strategy, and Detailed Whole Site Development Layout Plans, Highway, SuDS & Flood Risk Scheme Design Proposals

Refer to (SuDS Manual (C753), Chapter 4, Table 4.3); Chapters 4, 26 & 27 - Water Quality & Pollution Prevention

Purpose: To show (in detail and in context with the development as a whole), how the SuDS scheme will sustainably prevent the risk of pollution to land and water, and where possible, enhance water quality, water related amenity and biodiversity in the future. Information that needs to be provided includes:		Reviewed & accepted
a)	Have the minimum water quality management requirements been considered & are they able to be met?	
b)	Information on type & strength of contaminants & polluting materials.	
c)	How have these potential contaminants been managed close to the source & on the surface?	
d)	Details of what SuDS components have been provided in series (SuDS train) to cleanse flow prior to point of discharge.	
e)	Information on how sediment is trapped & retained on site.	
f)	Details of accessibility to undertake sediment cleansing & other maintenance activities.	
g)	How have the impacts from accidental spills been addressed?	
h)	Written evidence of discussion & agreement with the Environment Agency.	

Landscape Plan Requirements

Refer to (SuDS Manual (C753), Chapter 29

The objectives of the landscape plan are to : • Design for effective attenuation, flow control and exceedance; • Improve water quality; • Design an attractive feature in the local landscape; • Improve ecological function and biodiversity; • Use land efficiently and enhance land values; and • Assess risk and reflect the response within the design. Specific information that needs to be submitted includes:		Reviewed & accepted
a)	Detailed overall layout, ground contouring, planting, hard, soft & water features.	
b)	Detail landscape elements to improve water quality.	
c)	Show how the design achieves effective attenuation, flow control &	

	exceedance.	
d)	Improvements to ecology & biodiversity.	
e)	Detailed consideration of effective routine & periodic maintenance activities.	
f)	Full understanding of the sites character: slope, gradient, ground modelling, geology, soils types, natural drainage patterns.	
g)	Show existing features to be preserved, enhanced, removed &/or replaced.	
h)	Details of any soils stabilization/reinforcement & erosion control.	

Construction Management Plan Requirements

SuDS Manual (C753), Chapter 29 – Landscape Plans & Chapter 31 - Construction

Purpose of the Construction Management Plan: To ensure the developer and their contractors have taken reasonable steps to ensure risks from flooding and pollution are appropriately managed and mitigated during the construction phase of the development. Specific information that needs to be submitted includes:		Reviewed & accepted
a)	Strategy stating how surface water runoff on and from the will be managed during the construction.	
b)	Details of temporary pollution control measures.	
c)	Details of how permanent SuDs features will be protected during construction.	
d)	Drawing showing the sequencing of the construction activities	

Construction Method Statement Requirements

Refer to SuDS Manual (C753), Appendix B, - Section B.6 -Construction Method Statements & Assessment Checklists

Purpose of the Construction Method Statement: To ensure the developer and their contractors have taken reasonable steps to ensure risks from flooding and pollution are appropriately managed and mitigated during the construction phase of the development. Specific information that needs to be submitted includes:		Reviewed & accepted
a)	Details of the nature of the work to be completed.	
b)	Site plans & full scheme drawings, where required to support the method of approach.	
c)	Consents & reinstatement requirements.	
d)	Access points & details.	
e)	Any site-specific ecological issues, or features that require protection &/or consideration.	
f)	Pollution control arrangements & any likely water quality issues resulting from the highways & SuDS construction.	
g)	The proposed strategy for sediment control, erosion control & site drainage during the construction of the development, where this impacts on the SuDS proposed for the site, it should identify any potential impacts on the final performance of the drainage system & any necessary protection measures (or remedial works) such as silt removal at the end of construction of the development.	
h)	Measures to prevent the inadvertent access across the completed or partially completed SuDS; for example the area above a geo-cellular tank that has not been designed to support heavy traffic, or a completed	

	infiltration basin that cannot be trafficked, should be surrounded by a physical barrier, vehicle access routes should be clearly marked.	

Construction Phasing Plan Requirements		
Purpose of the Construction Phasing Plan: To ensure the developer and their contractors have taken reasonable steps to ensure risks from flooding and pollution are appropriately managed and mitigated during the construction phase of the development. Specific information that needs to be submitted includes:		Reviewed & accepted
a)	Strategy clearly stating how the development and/or phase of the development will drain during the construction and occupation of the development prior to adoption.	
b)	Drawing(s) showing the sequencing of phases of the development and how the drainage systems (permanent or temporary) connect to an outfall (temporary or permanent) during the construction and occupation of the development prior to adoption.	