Flood Risk and Drainage

Supplementary Planning Document

November 2023

DRAFT

Calderdale Council

CALDERDALE LOCAL PLAN

Flood Risk and Drainage Supplementary Planning Document

Contents

Appendices

Purpose and Status of this Document

1.1 The purpose of a Supplementary Planning Document (SPD) is to build on and add further detail to the policies in the Local Plan. They can be used to provide further guidance for development on specific sites, or on other issues, but as they do not form part of the Development Plan, cannot introduce new planning policies and should not add unnecessarily to the financial burden on development. They are subject to public consultation before they are adopted and are a material consideration in planning decisions. A consultation statement will accompany the adopted version of the SPD.

1.2 Following the adoption of the Calderdale Local Plan in March 2023, a significant amount of new development will occur in Calderdale in the next 20 years and beyond. The Council also declared a Climate Emergency in early 2019. To reduce the impact on the water environment, development must be appropriately located, well designed, managed and take account of the impacts of climate change and future urban development. The objectives are to ensure that the location and delivery of a development are sustainable and that no adverse effects to the water environment are created over the lifetime of the development. This SPD is intended to guide applicants, and potential applicants, through the process of complying with national and local policies, and legal requirements in relation to flood management and drainage matters. It also provides consistent procedures for the Council to follow when processing planning applications.

1.3 The SPD also emphasises the need for early and continued discussions with the Council s planning department, the Lead Local Flood Authority (LLFA), the necessary water management authorities and any organisation adopting the constructed drainage. Following the Flood and Water Management Act 2010, Calderdale MBC became the Lead Local Flood Authority (LLFA) responsible for managing flood risk from surface water, ground water and ordinary watercourses throughout the Borough. This SPD should be read in conjunction with all relevant guides, best practice documents, the National Planning Policy Framework (NPPF) and the CIRIA SuDS Manual. It is imperative that consideration be given to Sustainable Drainage (SuDS) design principles from the outset given their ability to assist with flooding, the risk from which will rise due to climate change and the multiple benefits they can bring, including increasing biodiversity. A separate SPD covers the issue of Biodiversity Net Gain and these two SPDs are inextricably linked.

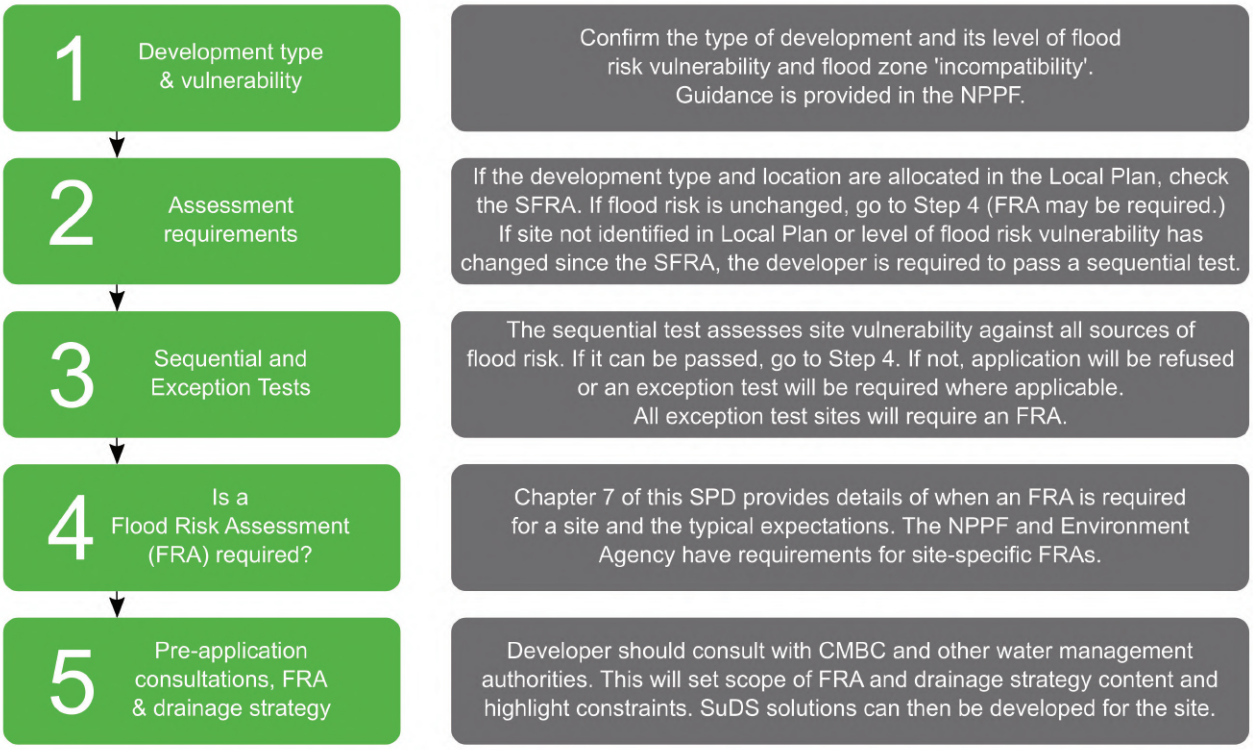
1.4 Whilst this SPD is a planning document, queries of a technical nature regarding flood risk and drainage should be directed to Calderdale s Flood Risk Management Team (LLFA@calderdale.gov.uk).

Consultation

1.5 Following consultation on the publication version (Reg 19) of the Local Plan in August 2018, comments received in relation to the flooding and water management polices were incorporated into this Draft SPD. These comments can be found at Calderdale Council's Consultation Portal - Keystone (objective.co.uk). Following a Public and Stakeholder consultation on the draft SPG in November 2018, comments received were evaluated and where appropriate incorporated into this iteration of the draft SPD.

1 Introduction

How to Use this Supplementary Planning Document



Catchment Description

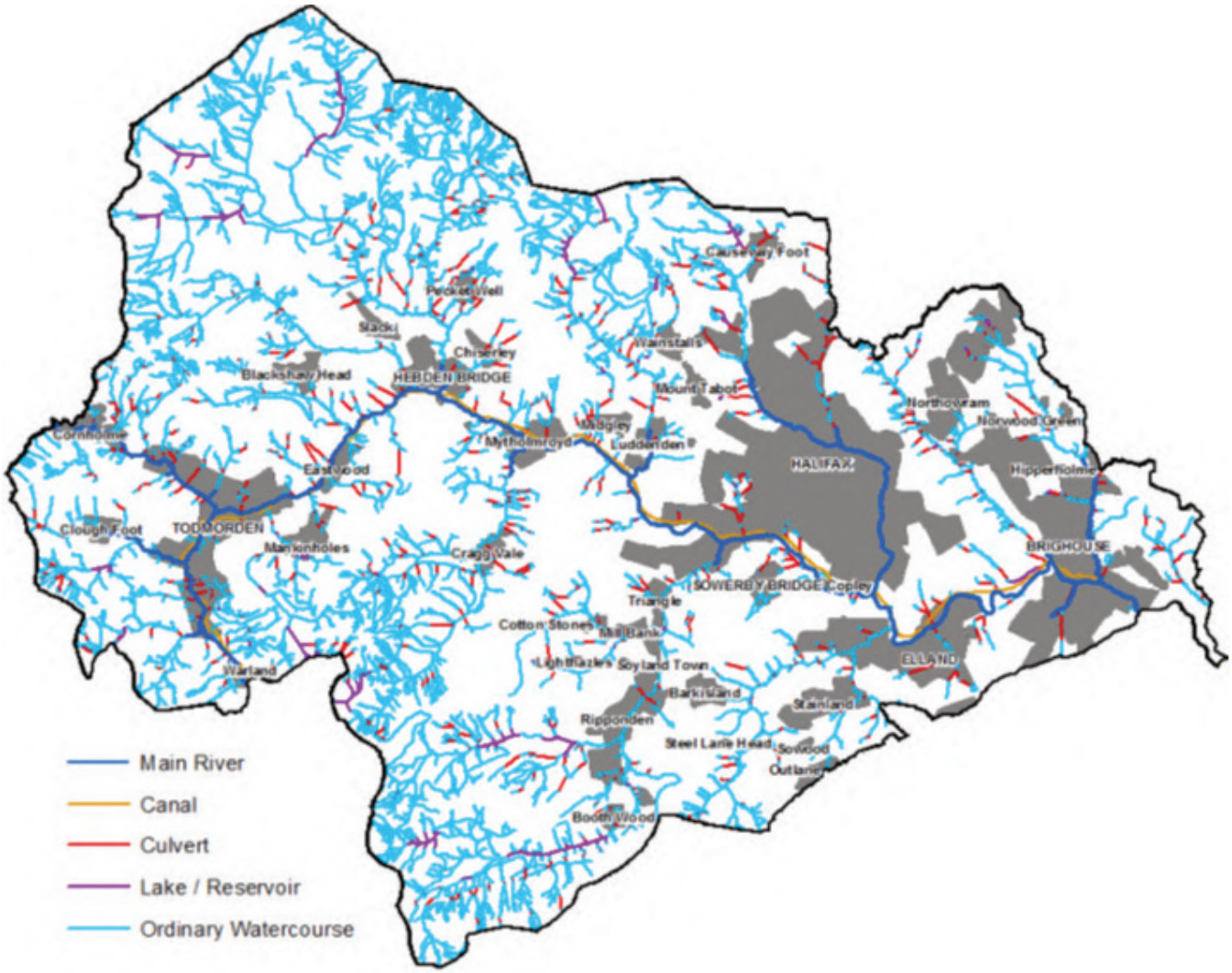
Please note: in this document the use of the terms "main river" and "ordinary watercourse" is as defined and designated by the Environment Agency.

2.1 The Calder catchment covers 360 sq km. Approximately 206,000 people live within Calderdale. The River Calder flows for approximately 40 km from its source, 400 m above sea level at Heald Moor, near Todmorden to Cooper Bridge where it passes out of the Borough of Calderdale into Kirklees.

2.2 The headwaters of the catchment are characterised by swift-flowing upland streams which then flow through a series of former mill towns nestling in narrow valley bottoms. Calderdale contains several main rivers including the River Calder which flows eastwards through the towns of Todmorden, Hebden Bridge, Mytholmroyd, Sowerby Bridge, Elland and Brighouse. The main tributaries of the Calder are Walsden Water in the west, the River Ryburn at Ripponden, and Hebble Brook in the east which drains Halifax. Walsden Water flows through the village of Walsden and joins the Calder in Todmorden. Smaller main river tributaries of the Calder include Hebden Water in Hebden Bridge, Cragg Brook at Mytholmroyd, Luddenden Brook at Luddenden, and Red Beck, Jumble Dike and Clifton Beck (all in Brighouse).

2.3 Alongside the main rivers, there are approximately 7,000 ordinary watercourses across Calderdale. An ordinary watercourse is any watercourse that has not been designated as a main river. These watercourses can vary in size considerably and can include rivers and streams and all ditches, drains, cuts, culverts, dikes, sluices, sewers (other than public sewers within the meaning of the Water Industry Act 1991) and passages, through which water flows. Figure 2-1 shows the river network within Calderdale including both main rivers and ordinary watercourses.

Figure 2.1 Calderdale river network



2 The Calder Catchment

History of Flooding

2.4 Flooding is a regular feature in Calderdale, with records of flooding incidents dating back to the early 17th century.

2.5 Runoff from the steep moorland above the urban areas in the Calder valley bottom causes major flooding problems. The highway network often acts as a convenient pathway for flood waters. There is a particular issue with sedimentation of culverts and other drainage assets due to material being transported from the surrounding moorland into the channel network leading to blockages of these assets. In the past this has led to backing up of flows causing regular flooding.

2.6 Flooding hotspots along the Calder Valley include Walsden, Ramsden Clough, Todmorden, Cornholme, Callis, Hebden Bridge, Cragg Vale, Mytholmroyd, Luddenden, Luddenden Foot, Sowerby Bridge, Copley, Elland and Brighouse.

2.7 Surface water flooding has also been an issue across Calderdale with such incidents reported along the Calder Valley at Walsden, Hebden Bridge, Midgley, Blackshaw, Todmorden, Callis, Mytholmroyd, Luddenden, Sowerby Bridge and Brighouse. Surface water flooding though is not confined to the main river valley with incidents also reported elsewhere in the Borough at Northowram, Siddal, and Halifax.

2.8 The canal and the river network in the Calder Valley are closely linked at a number of locations, which means that during times of significant river flooding, the canal can be inundated. Canals were not designed to convey significant flood flows. They were constructed to remain separate from the river catchments wherever possible. Significant flood events can lead to weirs and sluices being quickly overwhelmed by scale and severity of flood events.

European

The Water Framework Directive

3.1 The Water Framework Directive – 2000/60/EC (WFD) came into force in England in 2003 via The Water Environment (Water Framework Directive) (England and Wales) Regulations. There are four main aims of the WFD:

- To improve and protect inland and coastal waters
- To promote sustainable use of water as a natural resource
- To create better habitats for wildlife that lives in and around water, and
- To create a better quality of life for everyone

The Floods Directive

3.2 The aim of the EU Floods Directive - 2007/60/EC is to reduce and manage the risks that floods pose to human health, the environment, cultural heritage and economic activity. The Directive came into force in the UK through the Flood Risk Regulations 2009 which in turn sets the requirement for Preliminary Flood Risk Assessments (PFRA) to be produced by all unitary and county councils. The PFRA process is aimed at providing a high level overview of flood risk from local flood sources, including surface runoff, groundwater and ordinary watercourses. It is not concerned with flooding from main rivers or the sea. The latest draft Calderdale PFRA report concludes (based on the evidence collected) that there are no 'Flood Risk Areas of 'national significance within Calderdale.

National

Flood and Water Management Act 2010

3.3 The Flood and Water Management Act 2010 (FWMA) places the responsibility for coordinating 'local flood risk management on the relevant local authority, making them a Lead Local Flood Authority (LLFA). Calderdale MBC is the LLFA in this area. In this context, the Act uses the term 'local flood risk to mean flood risk from:

- Surface runoff
- Groundwater
- Ordinary watercourses

3.4 The FWMA contains a range of different duties for LLFAs, including the need to prepare a Local Flood Risk Management Strategy (LFRMS), carry out a FWMA S19 investigation following a major incident and to maintain a register of significant flood prevention assets.

National Planning Policy Framework and Practice Guidance

3.5 Section 14 of the National Planning Policy Framework 2021 (NPPF) sets out the government s aim that spatial planning should proactively help the mitigation of, and adaption to, climate change including management of water and flood risk.

3.6 The NPPF states that both Local Plans and planning application decisions should ensure that flood risk is not increased and where possible is reduced. Development should only be considered appropriate in flood risk areas where it can be demonstrated that:

- A site specific flood risk assessment has been undertaken which follows the Sequential Test, and if required, the Exception Test
- Within the site, the most vulnerable uses are located in areas of lowest flood risk unless there are overriding reasons to prefer a different location
- Development is appropriately flood resistant and resilient, such that in the case of a flood, it can be quickly be brought back into use without significant refurbishment
- Safe access and escape routes are included where appropriate
- That any residual risk can be safely managed, including by emergency planning, and
- The site gives priority to the use of sustainable drainage systems (SuDS)

3.7 The Government has also produced the National Planning Practice Guidance (PPG) to support the NPPF. Relevant sections of the NPPG advise on how spatial planning can ensure water quality and the delivery of adequate

water and wastewater infrastructure can take account of the risks associated with flooding and coastal change in plan-making and the planning application process.

Sustainable Drainage Systems - SUD Approval Body (SAB) - Section 3 of the FWMA 2010

3.8 In January 2023, the Department for Environment, Food and Rural Affairs (DEFRA) and Environment Minister, Rebecca Pow, announced[1] the government s decision to implement Schedule 3 of the Flood and Water Management Act 2010 in England to better control flooding and wastewater discharges.

3.9 The schedule, which was excluded from the Act s ratification 13 years before, is expected to be implemented in 2024 and will provide a framework for the approval and adoption of sustainable drainage systems to regulate rainfall, decrease the volume of water flowing into sewers and storm overflow discharges.

3.10 Schedule 3 provides a framework for the approval and adoption of drainage systems, a sustainable drainage system approving body within unitary and county councils, and national standards on the design, construction, operation, and maintenance of sustainable drainage systems for the lifetime of the development. It also makes the right to connect surface water runoff to public sewers conditional upon the drainage system being approved before any construction work can start.

3.11 Government will now give consideration to how Schedule 3 will be implemented, subject to final decisions on scope, threshold and process, while also being mindful of the cumulative impact of new regulatory burdens on the development sector.

3.12 Calderdale Council, in its capacity as the LLFA, will be directed by government to create a SAB and will produce further guidance for drainage and SuDS design when Section 3 of the FWMA (2010) is enacted in England.

3.13 Further guidance for adoption and maintenance of SUDS will also be produced when the SAB is enacted, this should be in conjunction with this report as a supplementary guidance for SABs and SUDS

3.14 The importance attached to the use of Sustainable Drainage Systems (SuDS) has been repeated through successive government publications, statements and case studies. Currently the CIRIA SuDS Manual C753 (2015) is the appropriate reference at the time of drafting this SPD. The most up-to-date document will apply to the implementation of the Local Plan policies in relation to water management, with any future updates or versions of the CIRIA SuDS Manual to be adhered to as best practice.

Regional

West Yorkshire Combined Authority SuDS Guidance

3.15 The purpose of this document is to provide developers with a brief introduction to sustainable drainage systems and techniques, and to provide guidance on the information that should be included with a planning application in order to promote the use of sustainable drainage systems in new developments. The guidance:

- Promotes delivery of high performance sustainable drainage proposals that remain effective for the lifetime of the development, with such proposals considered from the outset by developers, consultees and approval bodies
- Encourage sustainable development that is commensurate with the existing level of risk and that will be resilient to the predicted impacts of climate change
- Encourage the use of sustainable techniques that have a benefit to the environment, including improvement to amenity and biodiversity, and the quality of runoff entering the drainage network and watercourses
- Ensure that the current and future level of flood risk is not increased, and, where possible is decreased, to people, property and infrastructure through the implementation of the new development
- Support an efficient and effective planning application process that enables developers to demonstrate that their proposals comply with flood risk policy, guidance and standards

1 https://www.gov.uk/government/news/new-approach-to-sustainable-drainage-set-to-reduce-flood-risk-and-clean-up-rivers

Local

Local Plan

3.16 Policy CC2 'Flood Risk Management', Policy CC3 'Water Resource Management' and Policy CC4 'Catchment Management' of the adopted Local Plan form the basis of this SPD. These policies address all aspects of water management.

Policy CC2

Flood Risk Management (Managing Flood Risk in New Development)

I. The Council will require new development to follow a sequential risk based approach and be directed away from Flood Zones 2 and 3 in accordance with the principles of the National Planning Policy Framework. Proposals for development will only be permitted if it can be demonstrated that:

   a. Development cannot be accommodated in a lower flood risk zone;

   b. It would not give rise to the loss of flood plain storage;

   c. It would not impede the flow of flood water, surface water or obstruct the run-off of water due to high levels of groundwater;

   d. Measures required to manage any flood risk can be implemented;

   e. The management of surface water is done in a sustainable way. Development should enable/replicate natural water flows and decrease surface water runoff, particularly in Critical Drainage Areas, through Sustainable Drainage Systems, utilising green infrastructure and as directed by local standards and guidance. When installing Sustainable Drainage Systems, water quality should be enhanced and habitat creation facilitated where possible;

   f. Provision is made for the long term maintenance and management of any flood protection and/or mitigation measures;

   g. It will take into account climate change;

   h. The benefits of it to the community outweigh the risk;

   i. Development is resilient to the risks of flooding and positive design processes have been used to reduce any risks.

II. Proposals within Flood Zone 3ai will be assessed in accordance with national policies relating to Flood Zone 3a but with all of the following additional restrictions:

   a. No new highly vulnerable or more vulnerable uses will be permitted with less vulnerable uses only being permitted provided that the sequential test has been passed;

   b. Extensions should be linked operationally to an existing business;

   c. Redevelopment of a site should only provide buildings that occupy an equivalent or smaller footprint than the buildings they replace;

   d. Proposals should include flood mitigation measures (such as compensatory storage) as identified and considered through a site-specific Flood Risk Assessment; and

   e. Development will not be permitted on any part of the site identified through a site specific Flood Risk Assessment as performing a functional floodplain role.

III. Site-specific FRAs will be required for development proposals over 1 hectare in Flood Zone 1 and for development proposals in Flood Zones 2 and 3. Site-specific FRAs will also be required for development proposals which fall within CDAs, regardless of which Flood Zone applies. Prospective developers required to submit a site-specific Flood Risk Assessment must demonstrate that the development will be safe for its lifetime, taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall. In Critical Drainage Areas, a site-specific Flood Risk Assessment should also demonstrate that new development is not at risk from flooding from existing drainage systems or potential overflow routes.

IV. Development should have full regard to and compliance with the advice of the Environment Agency (or equivalent agency), the objectives and priorities for flood risk management set out in the Local Flood Risk Management Strategy and the published evidence of local flood risk and its significance as included in Strategic Flood Risk Assessments, Surface Water Management Plans and other recognised sources of flood risk data.

Policy CC3

Water Resource Management

I. The Council will work with key stakeholders to protect the quality and quantity of water resources; encourage their efficient use and ensure that they are provided where necessary. Priority will be given to:

   a. Protecting and enhancing ground and surface water features and preventing aquatic pollution;

   b. Ensuring new development has an adequate means of water supply, sufficient foul and surface water drainage and sewage treatment capacity;

   c. Only permitting development if there is no adverse impact to the quality or use of surface or ground water resources; and

   d. Only permitting development if there is no adverse impact on habitats and species dependent on the aquatic environment.

II. Proposals for development within a Groundwater Source Protection Zone should be supported by a hydrogeological (groundwater) risk assessment that identifies potential risks to groundwater from the development and identifies mitigation measures that will be implemented to reduce unacceptable risks.

III. Major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems used should:

   a. Take account of advice from the lead local flood authority;

   b. Have appropriate proposed minimum operational standards;

   c. Have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and

   d. Where possible, provide multifunctional benefits.

IV. Development will only be permitted if it can be demonstrated that the water supply and waste water infrastructure required is available or can be improved to meet the additional demand generated by the new development. Improvements that are necessitated by new development should be funded in advance of development commencing.

Policy CC4

Catchment Management

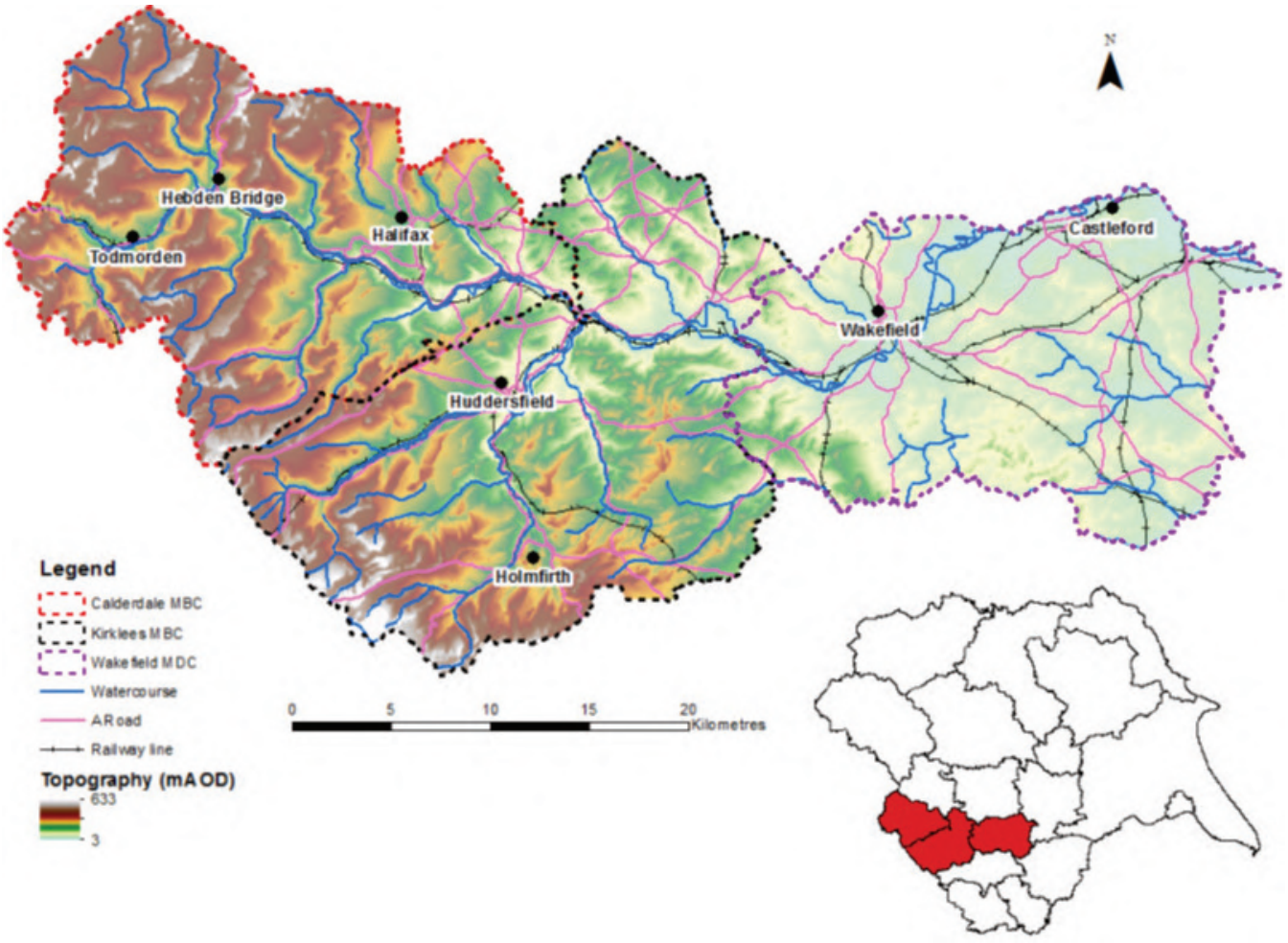
Proposals for natural flood management such as targeted land and vegetation management and planting in upper catchments and along watercourses will be supported in appropriate locations where they are consistent with national and Local Plan policies and relevant water catchment management plans to reduce flood risk and improve water quality. Proposals should aim to deliver multi benefit projects enhancing water quality, habitat and biodiversity. Proposals should have regard to sites designated and protected for their biodiversity and geodiversity importance and ensure that these are enhanced rather than damaged by the proposals.

Strategic Flood Risk Assessment

3.17 Strategic Flood Risk Assessments (SFRAs) are prepared by Local Planning Authorities (LPAs). The document informs land use planning decisions by assessing all sources of flood risk and providing flood risk information which considers climate change implications. This allows LPAs to apply the Sequential Test (as part of the National Planning Policy Framework (NPPF)), assign suitable sites for development and identify how flood risk can be reduced. SFRAs inform local development documents or area action plans.

3.18 Calderdale's SFRA was compiled in conjunction with Wakefield and Kirklees Councils. The Level 1 SFRA was produced in February 2016 and a specific report prepared for flood risk across Calderdale. Figure 3.1 shows the overall Calder catchment that is covered by the joint SFRA.

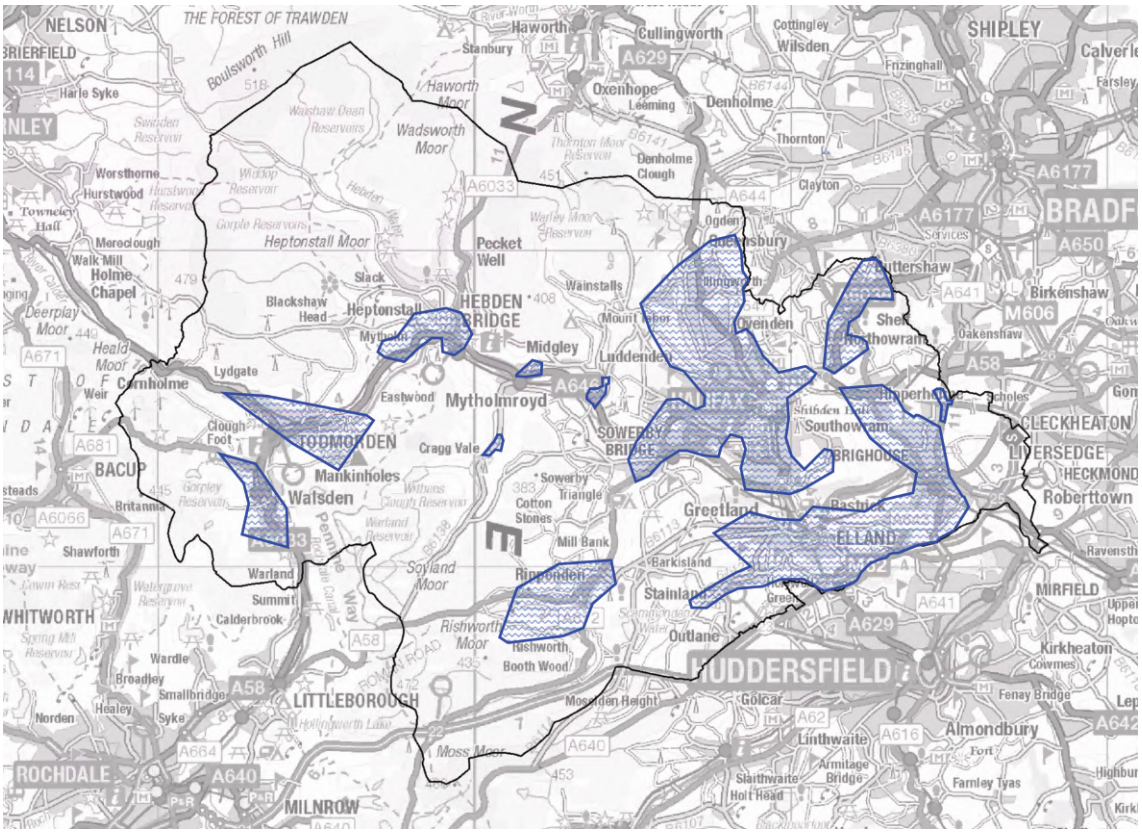
Figure 3.1 Strategic flood risk assessment: River Calder catchment



3.19 The core output of the Level 1 SFRA is a series of flood risk maps illustrating the risk to potential development sites together with a development site assessment spreadsheet which helps LPAs with Sequential Testing of their

sites. The Calderdale SFRA also provides a high level review of the potential for designating Critical Drainage Areas (CDAs). Figure 3.2 shows the locations of the CDAs designated.

Figure 3.2 Critical Drainage Areas



Flood Risk Management Strategy

3.20 Under the Flood and Water Management Act, Calderdale Council has a legal duty to develop, maintain, apply and monitor a Local Flood Risk Management Strategy (LFRMS). This Strategy is a tool to help understand and manage flood risk within Calderdale. Its principal aims are to tackle local flood risk including flooding from surface water, groundwater and ordinary watercourses.

3.21 Calderdale s LFRMS from 2016 is published on the Council s website. The strategy in based on four principle objectives:

- Building a better understanding of flood risk issues
- Taking steps to reduce flood risk in Calderdale
- Developing schemes that will manage residual flood risk
- Being better prepared for flood events

3.22 Calderdale s LFRMS is influenced by the CIRIA SuDS Manual C753, specifically the four pillars of SuDS design:

- Water quantity
- Water quality
- Amenity
- Biodiversity

Calderdale Flood Action Plan

3.23 Following devastating floods in the Calder Valley in winter 2015, the Environment Agency (EA) was tasked by the Secretary of State to put together a detailed Catchment Plan to manage and reduce the risk of flooding in

Calderdale over the next 25 years. The plan, entitled 'Calderdale Flood Action Plan', contains the actions that communities and partners feel are essential to help Calderdale recover from the floods and to improve resilience and reduce the risk of flooding. Many of the actions are ongoing and form part of other plans and programmes broken down into the following themes:

- Strengthening defences
- Natural flood management
- Resilient infrastructure
- Community resilience

3.24 The action plan is not a statutory document, but the Calderdale Flood Partnership Board has agreed to oversee the plan's delivery. This action plan is a 'living document that will be discussed, monitored and updated by the Calderdale Flood Partnership. All members of the partnership are committed to its delivery.

River Basin Management Plans

3.25 River Basin Management Plans (RBMPs) cover an entire river system, including river, lake, groundwater, estuarine and coastal water bodies. The River Calder catchment is included within the wider Humber River Basin District River Management Plan.[(2)] RBMPs are designed to protect and improve the quality of the water environment and are required under the Water Framework Directive. The Humber RBMP was updated in December 2022 and identified the following issues to tackle in the Calder catchment:

- Mitigation of the effects of heavily modified water bodies
- Point source pollution, primarily from water company assets
- Diffuse pollution, both urban and rural
- Litter and invasive species

3.26 The River Basin Management Plan is a significant driver for the 'Actionable Plan published by the Aire and Calder Catchment Partnership. The Catchment Partnership is hosted by the Rivers Trusts and works with a range of partners including Local Authorities, taking Defra s Catchment Based Approach to deliver 'A healthy and wildlife-rich water environment within the Aire and Calder that is valued and enjoyed, bringing increasing social and economic benefits to all .

Catchment Flood Management Plans

3.27 The Environment Agency has prepared catchment based guidance to ensure that main rivers and their respective flood risk have been considered as part of the wider river system in which they function. Catchment Flood Management Plans (CFMPs) discuss the management of flood risk for up to 100 years in the future by taking into account factors such as climate change, future development and changes in land management. As well as informing councils planning policy and local flood management practises, the CFMPs will be part of the mechanism for reporting into the EU Floods Directive. The relevant CFMP for Calderdale is for the River Calder and can be accessed on the Environment Agency s Catchment Flood Management Plan web pages. Any future updates to EU/UK legislation which may supersede the information in this SPD will need to be adhered to if any future updates are made.

Surface Water Management Plans

3.28 Surface Water Management Plans (SWMPs) are produced by Local Planning Authorities and outline the favoured surface water management strategy for the local area. SWMPs cover flooding from groundwater, sewers, drains, and runoff from land, ditches and small watercourses that results from heavy rainfall. The plans provide understanding of surface water flooding mechanisms and recommend mitigation measures. They can also provide evidence to inform Preliminary Flood Risk Assessments (PFRAs) as well as fulfilling the requirement of the Flood Risk Regulations (2009) for flood risk management plans.

3.29 SWMPs can be used to enhance the SFRA evidence base and vice versa. SWMPs should influence land-use planning, future capital investment, future developments, drainage maintenance and emergency planning. They help identify where SuDS can be incorporated for future development sites as well as consider effects on water quality to ensure the control of untreated discharges.

2 https://www.gov.uk/guidance/humber-river-basin-district-river-management-plan-updated-2022

3.30 The SFRA identified 11 indicative CDAs. SWMPs for indicative CDAs are to be produced. If an area is notified by the EA and/or LLFA as a CDA then a Flood Risk Assessment (FRA) is required for any new development within the CDA.

Neighbourhood

Neighbourhood Plan Policy

3.31 Neighbourhood planning gives local communities the power to develop a shared vision for their area. Neighbourhood plans can shape, direct and help to deliver sustainable development, by influencing local planning decisions as part of the statutory development plan. These plans are produced by the community, are examined, and adopted following approval in a referendum in the local area. They are then 'made' by the Local Planning Authority and become part of the development plan.

3.32 The plans may include their own requirements in relation to water management for their area.

3.33 Applicants should check Neighbourhood Plans on the Council's website.[3]

3 https://new.calderdale.gov.uk/planning-and-building-control/planning-policy/neighbourhood-planning

4 Roles and Responsibilities

4.1 A number of key Water Management Authorities (WMAs) may need to be consulted during the planning application process. Applicants are advised to seek advice in the early stages of formulating a development proposal in order to ensure all relevant flood and water requirements are appropriately addressed and met. Key WMAs in Calderdale are:

- Calderdale Council in its role as LLFA and Highway Authority
- The Environment Agency (EA), an executive non-departmental public body responsible to the Secretary of State for Environment, Food and Rural Affairs. Its principal aims are to protect and improve the environment, and to promote sustainable development.
- Yorkshire Water Services (YWS) in its role as the water and sewerage authority
- Canal & River Trust (CRT)

Table 4.1 Responsibilities of Water Management Authorities

Calderdale Metropolitan Borough Council	Environment Agency	Yorkshire Water Services
• Lead Local Flood Authority • Statutory Consultee for Surface Water Drainage • Emergency Planning • Highway Authority • Planning Authority	• Risk based management of flooding from main rivers and the sea. • Regulation of the safety of reservoirs with a storage capacity greater than 25,000m^3. This volume is planned to be reduced to 10,000m^3 when the relevant sections of the FWMA are implemented. • The EA has both a strategic overview of flooding of all kinds and local operational roles when it comes to management of flooding from main rivers and reservoirs. • It is the consenting body for works adjacent to and within main rivers.	• Respond to flooding incidents involving Yorkshire Water assets • Maintain a register of properties at risk of flooding due to a hydraulic overload in the sewerage network (DG5 register) • Undertake capacity improvements to alleviate sewer flooding problems on the DG5 register, as defined by the Office of Water Services (Ofwat) • Provide, maintain and operate systems of public sewers and works for the purpose of effectively draining an area • Cooperate with other relevant authorities in the exercise of their flood and coastal erosion risk management functions • Have regard to national and local flood and coastal erosion risk management strategies

5.1 This chapter provides advice on how to address flood risk in the planning process. It provides specific guidance on the application of the sequential approach to flooding, including the Sequential and Exception Tests, and the production of site specific flood risk assessments to accompany planning applications. The overall process is summarised in Figure 4.1 below.

Sources of Flood Risk

5.2 Developments can be affected by flooding from a number of sources, including:

Fluvial Flooding

5.3 Fluvial flooding is associated with the flooding from main rivers and ordinary watercourses. Fluvial flooding from watercourses depends on several catchment characteristics including the geography of the catchment, rainfall variations, channel steepness, the available floodplain, infiltration, the degree of urbanisation and the management of rural areas. Calderdale covers approximately 36,400 ha and lies within the catchment of the upper Calder.

5.4 The Flood Map for Planning produced by the EA provides an overview of fluvial flood risk for Main Rivers and contributing Ordinary Watercourses. The Flood Map For Planning provides the defined flood zones from available hydraulic modelling for major rivers but does not cover every watercourse and further modelling/assessment may be required.

Pluvial Flooding

5.5 Surface water flooding can occur anywhere in Calderdale where ground levels and steep terrain cause surface water to flow and accumulate. There are certain locations where the probability and consequence of these mechanisms are more pronounced due to complex hydraulic interactions in the urban environment. Urban watercourse connectivity, sewer capacity, and the location and condition of highway gullies all impact on surface water flood risk.

5.6 The updated Flood Map for Surface Water (uFMfSW) produced by the EA provides an overview of surface water flood risk. The uFMfSW is more refined than previous generations of the surface water flood map.

5.7 Pluvial flooding of land from surface water runoff is usually caused by intense rainfall that may only last a few hours, or even minutes in the case of some parts of Calderdale. In these cases, the volume of water falling on rural land can, in a short amount of time, exceed infiltration rates resulting in overland flow. Within urban areas, when rainfall intensity is too great for the urban drainage network, it results in excess water flowing along roads, through properties and ponding in natural low spots. Therefore, areas at risk can lie outside the fluvial flood zones.

5.8 Pluvial flooding within urban areas will typically be associated with events greater than the 1 in 30-year design standard of new sewer systems. Crucially, Calderdale has many old sewer and highway networks with significantly less capacity than the 1 in 30-year event. There is also a residual risk associated with these networks due to possible network failures, blockages or collapses.

5.9 The main cause of surface water flooding in Calderdale is the steep topography surrounding the various towns and villages in the Borough. A number of other contributing factors include:

- Compromised drainage infrastructure.
- Poor land management
- New developments
- Surface water and watercourse interaction
- Mine water
- Canal breaching / overtopping
- Large anomalous rainfall events
- A particular problem has been experienced in Brighouse and Todmorden where submerged drainage outfalls cause surface water to back up behind raised defences when flood levels are high in the receiving watercourses

Canal Flooding

5.10 There are two sections of canal within Calderdale. The Rochdale Canal passes from Warland, through Walsden, Todmorden, Hebden Bridge and Mytholmroyd to where it joins the Calder and Hebble Navigation at Sowerby Bridge. The Calder and Hebble Navigation then passes east through Copley, Elland and Brighouse before entering Kirklees. The Rochdale Canal and the Calder and Hebble Navigation are owned and maintained by the Canal & River Trust (CRT).

5.11 Both canals in Calderdale interact closely with the River Calder. During floods, flows from the River Calder, its tributaries and surface water runoff have been known to flow into the canal system causing flooding at locations some distance away. Excess flows of this nature can cause overtopping of the canal banks or breaching of embanked canal sections. The failure of canal assets such as lock gates and stop logs may also lead to flooding.

Reservoir Flooding

5.12 A reservoir is usually an artificial lake where water is stored for household supply and industrial use, for canals systems, for providing compensatory flows to watercourses and other purposes, such as fishing lakes or leisure facilities. The risk of flooding from reservoirs is reduced through regular maintenance by the operating authority. Reservoirs in the UK have an extremely good safety record with no incidents resulting in the loss of life since 1925.

5.13 The EA is the enforcement authority in England for the Reservoirs Act 1975. All large reservoirs must be regularly inspected and supervised by reservoir panel engineers. Local authorities are responsible for coordinating emergency plans for reservoir flooding and ensuring communities are well prepared. Local authorities should work with other members of the Local Resilience Forum (LRF) to develop these plans.

5.14 The EA has prepared reservoir flood maps for all large reservoirs that it regulates under the Reservoirs Act 1975 (reservoirs that hold over 25,000m^3 of water). The maps show the largest area that might be flooded if a reservoir were to fail and release the water it holds. The reservoir flood maps can be viewed online.[4]

5.15 There are 28 reservoirs of over 25,000m^3 volume within Calderdale. Twenty-three are owned by YWS, three by United Utilities, one by the EA and one is under private ownership. Furthermore, there are a number of smaller reservoirs within Calderdale that do not fall under the requirements of the Reservoirs Act and so the implications of a failure have not been assessed. These smaller reservoirs have been included in the Flood Risk Asset Data Record and the condition assessed.

Sewer Flooding

5.16 Combined sewers, conveying waste and surface water, serve many urban areas with residential homes, businesses and highways. Combined Sewer Overflows (CSOs) provide a release for excess flows from the drainage system into local watercourses or large surface water systems. Some areas may also be served by separate foul and surface water sewers which convey waste water to treatment works and surface water into local watercourses.

5.17 Flooding from the sewer network mainly occurs when flow entering the system exceeds its available discharge capacity, the system becomes blocked or it cannot discharge due to a high water levels in the receiving watercourse. Pinch points and failures within the drainage network may also restrict flows. Water then begins to back up through the sewers and surcharge through manholes, potentially flooding highways and properties.

5.18 It should be noted that sewer flooding in 'dry weather' resulting from blockage, collapse or pumping station mechanical failure (for example), is the sole concern of Yorkshire Water as the drainage undertaker.

4 https://check-long-term-flood-risk.service.gov.uk/map — select 'flood risk from reservoirs in the drop-down menu

Groundwater

5.19 Groundwater flooding is caused by the emergence of water from beneath the ground, either at point or diffuse locations. The occurrence of groundwater flooding is usually local and, unlike flooding from rivers and surface water, does not generally pose a significant risk to life because of the slow rate at which the water level rises. However, groundwater flooding can cause significant damage to property, especially in urban areas, and poses further risks to the environment and ground stability.

5.20 There are several mechanisms that increase the risk of groundwater flooding including prolonged rainfall, high in-bank river levels, artificial structures, groundwater rebound and mine water rebound. Properties with basements or cellars or that are located within areas susceptible to groundwater flooding are at particular risk.

5.21 Development within areas susceptible to groundwater flooding will generally not be suited to proposals for infiltration drainage but this is dependent on a detailed site investigation and risk assessment which should also consider the possibility of groundwater remergence. Other forms of SuDS may still be suitable and these should be explored further as part of a detailed site assessment.

Likelihood and Risk of Flooding

5.22 Flood risk is an expression of the combination of the flood probability (how likely the event will happen) and the magnitude of the potential consequences (the impact such as economic, social or environmental damage) of the flood event.

5.23 The likelihood or risk of flooding can be expressed in two ways:

- Chance of flooding: As a percentage chance of flooding each year. For example, for Flood Zone 3a there is a 1% annual probability of this area flooding.
- Return period: This term is used to express the frequency of flood events. It refers to the estimated average time interval between events of a given magnitude. For example, for Flood Zone 3a the return period would be expressed as 1 in 100 year.

5.24 However, there is a move away from using return periods as an expression of flood risk as this approach does not accurately express the risk of flooding. For example, it is misleading to say that a 1 in 100 year flood will only occur once in every hundred years. This suggests that if it occurs in one year then it should not be expected to reoccur again for another 100 years; however this is not the case. The percentage chance of flooding each year, often referred to as annual probability, is now the preferred method of expressing flood risk.

5.25 Fluvial flooding is divided into flood zones based on the risk of flooding as shown in Table 5.1:

Table 5.1 Fluvial Flood Zones

	Functional flood plain	High probability/risk	Medium probability/risk	Low probability/risk
Flood Zones	3b	3a	2	1
Return Period	1 in 25 or greater or designed to flood in a 1 in 1000 year flood	1 in 100 or greater	1 in 100- 1 in 1000	<1 in 1000
Annual Exceedance Probability	4% or designed for 0.1%	1%	1% - 0.1%	<0.1%

High risk <----------> Low Risk

5.26 Maps showing flood zones are available on the gov.uk website. The Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences. Table 5.2 details the flood zones and their definitions.

Table 5.2 Flood Zone Definitions

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 1 in 1,000 year return period (0.1% annual probability) of river or sea flooding. (Shown as 'clear on the EA Flood Map – all land outside Zones 2 and 3)
Zone 2 Medium Probability	Land having between a 1 in 100 year and 1 in 1,000 year return period (1% and 0.1% annual probability) of river flooding; or land having between a 1 in 200 year and 1 in 1,000 year return period (0.5% and 0.1% annual probability) of sea flooding. (Land shown in light blue on the EA Flood Map)
Zone 3a High Probability	Land having a 1 in 100 year return period (1% annual probability) or greater of river flooding; or Land having a 1 in 200 year return period (0.5% annual probability) or greater of sea flooding. (Land shown in dark blue on the EA Flood Map)
Zone 3b The Functional Floodplain	This zone comprises land where water from rivers or the sea has to flow or be stored in times of flood. This includes land that would flood with an annual probability of 1 in 20 (5%) or greater in any year, or is designed to flood in an extreme (0.1%) flood, such as a flood attenuation scheme. The Council s Local Plan identifies in the Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the EA Flood Map)

5.27 As part of the SFRA, a further indicative flood zone has been delineated called Flood Zone 3ai. Flood Zone 3ai includes developed land with the same level of risk as Flood Zone 3b where water would flow or be stored in times of flooding if not already constrained by development. In NPPF terms this is part of Flood Zone 3a but following discussions with the local authorities and the Environment Agency it was agreed that Flood Zone 3a should be subdivided. Identification of zone 3ai allows the councils to assess risk within 3a in more detail showing areas where existing development is likely to be restricting flood flows and water storage that would otherwise be within the functional floodplain.

5.28 Should sites in Flood Zone 3ai become available for new or further development (e.g. as brownfield sites) then both the risk at the sites and their role in managing flood risk in the surrounding area should be carefully considered with no increase in development footprint. Flood Zone 3ai includes the areas of land that would be in Flood Zone 3b if not already developed and should therefore be used as an indicator of flood risk, from a modelled 1 in 20 year event (5% AEP), to existing developed sites.

Climate Change

5.29 The National Planning Policy Framework (NPPF) and supporting Planning Practice Guidance (PPG) on Flood Risk and Coastal Change set out how the planning system should help minimise vulnerability and provide

resilience to the impacts of climate change. Making an allowance for climate change will help to minimise vulnerability and provide resilience to flooding and coastal change in the future. The climate change allowances are predictions of anticipated change for:

- Peak river flow by river basin district
- Peak rainfall intensity
- Sea level rise
- Offshore wind speed and extreme wave height

5.30 They are based on climate change projections and different scenarios of carbon dioxide (CO^2) emissions to the atmosphere. There are different allowances for different periods of time over the next century. Table 5.3 shows the anticipated changes to peak flow by river basin district due to climate change. In addition to the tables below reference should be made to the latest climate change allowances as stated by the Environment Agency and should be adhered to.

5.31 Calderdale is located within the Aire and Calder Management area for Peak River Flow Allowances, which is available here.[5]

5.32 Climate change allowances are then split into

- The flood zone the development site falls within (if in multiple zones, use the greater risk zone)
- The anticipated lifespan of the development type (Residential developments should be considered to have a 100 year lifespan), and
- An allowance category based on percentiles of flow

Using peak river flow allowances for flood risk assessments

5.33 Use the flood risk vulnerability classification to classify the vulnerability of your development. Assess both the central and higher central allowances for strategic flood risk assessments.

Table 5.3 Using Peak River Flow Allowances for Flood Risk Assessments

	Flood Zone 2 or 3a	Flood Zone 3b
Essential infrastructure	Use the higher central allowance	Use the higher central allowance
Highly vulnerable	Use central allowance (development should not be permitted in flood zone 3a)	Development should not be permitted
More vulnerable	Use the central allowance	Development should not be permitted
Less vulnerable	Use the central allowance	Development should not be permitted
Water compatible	Use the central allowance	Use the central allowance

5.34 Apply the peak river flow allowances to developments and allocations where the strategic flood risk assessment shows an increased risk of flooding in the future. This includes locations that are currently in flood zone 1, but might be in Flood Zone 2 or 3 in the future.

To ensure the safety of people using the development when designing safe access, escape routes and places of refuge, use the central allowance for all development types except for essential infrastructure. Use the higher central allowance for this.

If the local planning authority consider the development is appropriate, even though it will not follow the flood zone compatibility categories for Flood Zones 2, 3a or 3b, use the higher central allowance.

5 https://environment.data.gov.uk/hydrology/climate-change-allowances/river-flow?mgmtcatid=3001

Where it is appropriate to apply a credible maximum scenario, use the upper end allowance..

Table 5.4 Peak River Flow Allowances by River Basin Management Area

River Basin Management Area	Allowance Category	Total potential change anticipated for the 2020s' (2015 to 2039)[1]	Total potential change anticipated for the 2050s' (2040 to 2069)[1]	Total potential change anticipated for the 2080s' (2070 to 2115)[1]
Aire and Calder	Upper End	24%	31%	51%
	Higher Central	15%	18%	31%
	Central	11%	13%	23%

1. Based on a 1981-2000 baseline

Using peak rainfall allowances for flood risk assessments

5.35 Increased rainfall affects river levels and land and urban drainage systems. Table 4.4 shows anticipated changes in extreme rainfall intensity in small and urban catchments. The latest climate change allowance from the Environment Agency are now based on River Basin Management Areas, of which Calderdale sites within the Aire and Calder Management Area available here.[6]

5.36 Allowances are separated for two future time-frames based on the anticipated lifespan of the development, labelled 2050s and 2070s. Use 2050s for development with a lifetime up to 2060 and use 2070s for development with a lifetime between 2061 and 2125 (based on a baseline of 1981-2000).

5.37 The range of allowances included is based on percentiles. A percentile describes the proportion of possible scenarios that fall below an allowance level. The 50th percentile is the point at which half of the possible scenarios for peak flows fall below it, and half fall above it.

The central allowance is based on the 50th percentile and the upper end allowance is based on the 95th percentile.

Use the development lifetime guidance to work out the lifetime of your development. You should consider residential development to have a minimum lifetime of a 100 years.

Development with a lifetime beyond 2100, this includes development proposed in applications or local plan allocations.

For flood risk assessments and strategic flood risk assessments assess the upper end allowances. You must do this for both the 1% and 3.3% annual exceedance probability events for the 2070s epoch (2061 to 2125).

Design your development so that for the upper end allowance in the 1% annual exceedance probability event:

- There is no increase in flood risk elsewhere
- Your development will be safe from surface water flooding

5.38 For development with a lifetime between 2061 and 2100 take the same approach but use the central allowance for the 2070s epoch (2061 to 2125).

5.39 For development with a lifetime up to 2060, take the same approach but use the central allowance for the 2050s epoch (2022 to 2060).

6 https://environment.data.gov.uk/hydrology/climate-change-allowances/rainfall?mgmtcatid=3001

Aire and Calder Management Catchment Peak Rainfall Allowances

Table 5.5 Aire and Calder Management Area - 3.3% AEP Event

	Central Allowance	Upper End Allowance
2050s	20%	35%
2070s	25%	40%

Table 5.6 Aire and Calder Management Area - 1% AEP Event

	Central Allowance	Upper End Allowance
2050s	25%	40%
2070s	30%	45%

The peak rainfall allowances above are based on a 1981-2000 baseline.

6 Planning and the Sequential Approach to Flood Risk

6.1 The sequential approach to flood risk and planning aims to ensure that development is located in the areas of lowest flood risk. This can be applied at variety of scales, including:

- At a strategic scale, when looking at a number of sites and then choosing the site with the lowest flood risk for development
- At an individual scale, where the area of lowest flood risk within the site boundary is the preferred location for the proposed development
- At a building scale, where the part of the building that is the most vulnerable is located in the area of lowest flood risk

The Sequential Approach should apply to all sources of flood risk and is central to the Government's approach as outlined in the National Planning Policy Framework (NPPF) and accompanying Planning Practice Guidance (PPG). An example of this is that when considering fluvial flood risk, al developments should be located in Flood Zone 1 unless there are no reasonably available sites. Only then should Flood Zone 2 be considered. Flood Zone 3 should only be considered if there are no reasonably available sites in Flood Zones 1 and 2.

Site Suitability

6.2 Those proposing development in areas of flood risk are responsible for:

- Demonstrating that the proposed development is consistent with national and local planning policy
- Undertaking appropriate consultation with the water management authorities
- Providing a site specific flood risk assessment (FRA), as part of the planning process, which meets the requirements of this chapter and those set by the relevant WMAs
- Integrating into proposals designs that reduce flood risk to the development and elsewhere by incorporating appropriate flood risk management measures including the use of sustainable drainage systems, and
- Ensuring that any necessary flood risk management measures are sufficiently funded to ensure that the site can be developed and occupied safely throughout its proposed lifetime

6.3 Applications for sites in Flood Zones 2 and 3 where there is no Sequential Test information submitted will be deemed to have failed the Sequential Test.

6.4 The following sections set out the steps (1 – 6) that should be taken when determining if a site is suitable for development when considering flood risk. All requirements are consistent with the NPPF and PPG, with local requirements explained further. Reference should also be made to this SPD alongside other relevant and up to date information related to flood risk and the water environment.

Table 6.1 Determining Whether a Site is Suitable for Development

Step 1 – Allocation within Local Development Plan
Applicants must consider allocations within the relevant local development plan. If the site has been allocated in the relevant Local Plan/development plan for the same land use type/vulnerability classification that is now being proposed, then an assessment of flood risk, at a strategic level, has already been undertaken. This will have included assessing the site, against other alternative sites, as part of a Sequential approach to flood risk. In general where a site has not been allocated in a Local Plan or the flood zone classification has changed since adoption of the Plan (i.e. it is a windfall or non-allocated site), the Sequential Test and where appropriate the Exception Test will need to be undertaken following the overarching principles of the Sequential Approach. Applicants should indicate their site boundary on a plan and if applicable the boundary of any allocated site and check the flood risk information stated in the SFRA.

Step 2 – Consider flood risk
Is the site: • In Flood Zone 2 or 3?

Step 2 – Consider flood risk

- In Flood Zone 1 and within an area that has been identified in the SFRA (or any updated available information) as having flooding issues now or in the future (for example, through the impacts of climate change)?
- In an area of significant flood risk from sources other than fluvial such as surface water, ground water, reservoirs, sewers, etc.?

If the answer to any of the above questions is yes, the Sequential Test is required to be undertaken by the developer and the results submitted to the LPA for assessment. Note:

Discussions on the Exception Test should not be taking place until the Sequential Test is undertaken and the requirements of the Sequential Test met.

Following on from Steps 1 and 2, if no pre-application consultation has already been undertaken, it is strongly recommended that such discussions are undertaken with the LPA and the appropriate WMAs.

The purpose of pre-application consultations is to identify the range of issues that may affect the site and, following on from the Sequential Test and if necessary the Exception Test, determine whether the site is suitable for its intended use. An FRA should not normally be undertaken until Steps 1 to 3 have been carried out.

Step 3 – Undertake pre-application consultation

Ongoing and iterative discussions with the LPAs and relevant WMAs can resolve issues prior to the submission of a planning application and can result in a more efficient planning application process. It is recommended to consider the following at this stage:

- Does the LPA confirm that the proposed development may be acceptable in principle from the perspective of other planning constraints rather than flood risk?
- Does the LPA confirm that the Sequential Test, and if required the Exception Test, has been undertaken appropriately and that it covers all relevant issues?
- Is there potential for contamination on site which could affect its design and layout and the types of SuDS components used?
- How can the site meet national and local SuDS standards?
- Is a site specific FRA required? If so, what is the scope of an appropriate site specific FRA?
- Are there any major opportunities or constraints to the site with regards to the management of flood risk, drainage, contamination or the quality of related water environments?
- Agree the discharge points for site drainage with the LPA and relevant WMA;
- Obtain any relevant data needed in order to prepare the site specific FRA and drainage strategy.
- Are any consents or permits required from the EA, Lead Local Flood Authority and YW?

Once all these stages have been considered please go to Step 4.

In areas of Calderdale that are defended from flooding the residual risk of breaching of the defence can mean that some locations in Flood Zone 1 could be at risk of flooding. While the EA s recognised flood maps show the areas that would be at risk if there were no defences, the failure of such structures can produce different results. The pressure the water may be under at the time of breach and the pathway that it is forced to take may not be the same as if water were naturally overtopping the river banks. For this reason an FRA may be required for sites proposing residential uses in defended areas that are actually within Flood Zone 1. If this situation applies, breach modelling is also likely to be required as part of the planning process. Advice should be sought from the EA if further explanation is required on this point.

Step 4 – Site-specific Flood Risk Assessment (FRA)

A site specific FRA is required:

- For proposals of 1 hectare or greater in Flood Zone 1

Step 4 – Site-specific Flood Risk Assessment (FRA)

- For all proposals for new development (including minor development and change of use) in Flood Zones 2 and 3
- In an area within Flood Zone 1 which has critical drainage problems (as notified to LPAs by the EA)
- For any proposal in an indicative Critical Drainage Area as identified in the SFRA or in an Area with Critical Drainage Problems (ACDP) as identified by the EA, and
- Where proposed development, or a change of use to a more vulnerable class, may be subject to other sources of flooding

An FRA may also be required for some other specific situations:

- If the site may be at risk from the breach of a local defence
- Where the site is intended to discharge to the catchment or assets of a WMA which requires a site-specific FRA
- Where evidence of historical or recent flood events requires an FRA
- In an area of medium or high risk of surface water flooding. A high means that each year the area has a chance of flooding of greater than 3.3%. Medium risk means that each year this area has a chance of flooding of between 1% and 3.3%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.

Step 5 – Surface water drainage strategy

A surface water drainage strategy contains the proposals for the surface water drainage of the development. Such a strategy should include initial proposals that are sufficient to demonstrate a scheme can be delivered that will adequately drain the proposed development whilst not increasing flood risk elsewhere.

If an outline application is to be submitted for a major development then an outline surface water drainage strategy should be submitted outlining initial proposals and quantifying the conceptual surface water management for the site as a whole. This should detail any strategic and existing features, including their size, location and detail where the site will outfall to. A detailed surface water drainage strategy should subsequently be submitted with each reserved matters application that comes forward and demonstrate how it complies with the outline surface water drainage strategy.

The surface water drainage strategy should be prepared ensuring consistency between the surface water flood risk and any initial drainage proposals discussed in the FRA. The surface water drainage strategy should be included within or alongside the FRA as part of the planning application submissions.

The drainage strategy should be worked up in tandem with the site layout and highway designs. This will help avoid abortive work in any one area. At this stage the following should be considered:

- The submission requirements, including any supporting investigations
- Sustainable drainage design principles
- Existing drainage infrastructure is detailed and proven to be in good condition.
- Existing watercourses and culverts near to or within the site are investigated and proven to be in good condition.
- Interception, infiltration, flow rate runoff control, volumetric runoff control, and exceedance flow management
- Site discharge location and attenuation provision
- Water quality treatment, habitat provision and biodiversity
- Health and safety, access and amenity
- Use the correct climate change allowances for the development based on its lifetime
- Ensure that the required management and maintenance of all site features has been clearly set out as part of the drainage strategy. Get initial agreements in place to cover management funding for the lifetime of the development. Check for any ecological impacts and if applicable, Water Framework Directive (WFD) impacts, as part of all of the flood and drainage measures proposed.

Step 6 – Submission of planning application

Once all these issues have been satisfactorily addressed then a planning application supported by, where necessary, evidence of the Sequential Test, the Exception Test, a site-specific FRA and a surface water drainage strategy, can be submitted.

Sequential Test

6.5 The Sequential Test was developed to steer developments to areas with the lowest probability of flooding. Generally development will not be permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower probability of flooding. This is applicable for all sources of flooding.

6.6 The Sequential Test does not need to be applied for:

- Individual developments on sites which have been allocated in development plans as the Sequential Test process has already been undertaken (unless the Flood Zones for the site have changed)
- Minor development or change of use (except for a change of use to a caravan, camping or chalet site, or to a mobile home or park home site)
- Sites located wholly in Flood Zone 1

6.7 The definition of minor development for the purposes of the Sequential Test is:

- **Minor non-residential extensions**: industrial/commercial/leisure extensions with a footprint less than 250 square metres
- **Alterations**: development that does not increase the size of buildings, e.g. alterations to external appearance
- **Householder development**: for example sheds, garages, games rooms, etc., within the curtilage of the existing dwelling, in addition to physical extensions to the existing dwelling itself. This definition excludes any proposed development that would create a separate dwelling within the curtilage of the existing dwelling e.g. subdivision of houses into flats.

6.8 All sources of flood risk should be considered when assessing the need for the Sequential Test as well as undertaking the test.

6.9 It is generally expected that in areas with extensive Flood Zone 1, the Sequential Test will be more effective at steering development away from Flood Zones 2 and 3. However, where there is extensive Flood Zone 3 in the area of search, the development s objectives are less likely to be met in Flood Zone 1. In these cases, developers may need to carry out further flood risk appraisal work to determine which sites are safest and at lowest risk to develop.

6.10 The following sets out how applicants should undertake the Sequential Test for assessment by the LPA. This would normally take the form of the submission of a report commensurate in size to the scale of development.

Figure 6.1 Sequential Test

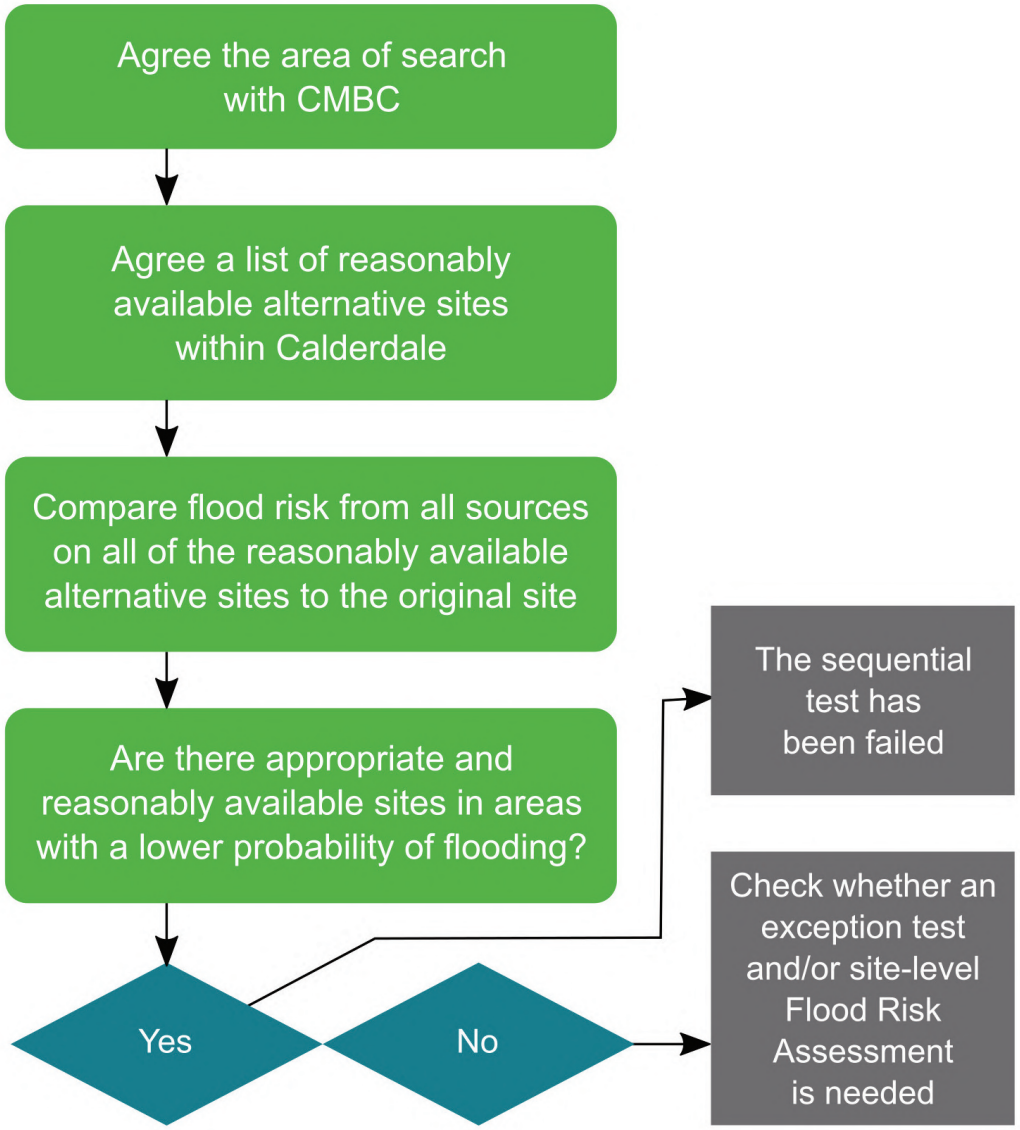


Table 6.2 Sequential Test

Stage A – Applicant to agree with the LPA the geographical area over which the test is to be applied
This is usually over the entire LPA area and may only be reduced in discussion with the LPA because of the functional requirements and objectives of the proposed development (e.g. catchment area for a school, community facilities, a shop, a public house, appropriate land use areas and regeneration zones etc.) and because there is an identified local need for that type of development. The Local Plan should be the starting point to understand areas of local need.

Stage B – Developer to identify and list reasonably available sites
Additionally, a site is only considered to be reasonably available if all of the following apply: • The site is within the agreed area of search • The site is not safeguarded in the relevant Local Plan for another use • It does not have any issues (e.g. constraints or designations) that cannot be overcome and that would prevent development on the site

Stage B – Developer to identify and list reasonably available sites

Reasonably available sites will include a site or a combination of sites capable of accommodating the proposed development. These may be larger, similarly sized or a combination of smaller sites that fall within the agreed area of search.

Stage C – Developer to obtain flood risk information for all sites from available datasets

This can be obtained from a number of organisations. The starting point should be the LPA's Strategic Flood Risk Assessment (SFRA) which contains known flood risk information at the date of its publication.

However, flood risk information is updated on a regular basis and there may be more up to date information available, so the content of the SFRA should be checked against the following:

- The EA's Flood Zone Maps for Planning (River and Seas)
- The EA's Updated Flood Map for Surface Water
- British Geological Society maps for Areas Susceptible to Groundwater Flooding (also available in the Calderdale SFRA)
- The Council's Surface Water Management Plans
- Flood Asset Data published by the EA and Calderdale MBC. Detailed modelled flood levels, where available, can be obtained from the Flood Map for Planning directly for Product 4 information or via the EA s Customers and Engagement team at neyorkshire@environment-agency.gov.uk. Please refer to the EA website for details on the products available.
- Any other source of local flood risk known to the WMAs; and Hazard Mapping and other information, where available

Stage D – Developer to apply the Sequential Test

Compare the flood risk from all sources on all of the reasonably available sites to the original site.

Are there any reasonably available sites, including a combination of sites, that have a lower flood risk?

Developments should be located within areas with the lowest flood risk, and if possible in Flood Zone 1. The presence of existing defences should not be taken into consideration when undertaking the Sequential Test. The maintenance of the defences may change over time and climate change will have an impact on the level of protection that they offer.

The Sequential Approach is required at all stages of the planning process. Only where it is not possible to locate development in Flood Zone 1 and there is a recognised need for the development, it will be necessary to compare alternative sites within the same Flood Zone. In these circumstances, the actual risks of flooding can be taken into consideration using available flood hazard information. The aim will be to locate development in the lowest risk areas of that Flood Zone taking into account the ambient probability and consequences of flooding. The Exception Test may also still be required depending on the Flood Zone and the development type.

Proposed site mitigation measures should not be taken into consideration when undertaking the Sequential Test - these are assessed through the Exception Test and the site specific FRA.

Developers should list the reasonably available sites considered against the original site, state how they compare regarding flood risk and any reasons why they are unsuitable or not available within the report.

Stage E – Conclusion

If the site is not within Flood Zone 1, are there any reasonably available sites in areas with a lower probability of flooding that would be appropriate to the type of development or land use proposed? If not, this still does not mean that the proposed development is acceptable in terms of flood risk as it may be necessary to undertake the Exception Test and a site specific flood risk assessment.

Exception Test

6.11 As explained within paragraph 161 of the NPPF, the Exception Test is applied to the proposal by the developer where, following application of the Sequential Test it is not possible, consistent with wider sustainability objectives, for the development to be located in zones with a lower risk of flooding.

6.12 Development is classified, according to the PPG, depending on the impact of flooding on the development. This is known as its Flood Risk Vulnerability Classification and can be found in Appendix 2 of this SPD.

6.13 Using the vulnerability classification in Appendix 2 and the table below, developers are required to check whether the vulnerability classification of the proposed land use is appropriate to the Flood Zone in which the site is located and to see if the Exception Test is required.

Table 6.3 Flood Risk Vulnerability and Flood Zone Compatibility

Flood Zones	Flood Risk Vulnerability Classification				
	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
1	Y	Y	Y	Y	Y
2	Y	Exception Test Required	Y	Y	Y
3a*	Exception Test Required	N	Exception Test Required	Y	Y
3b**	Exception Test Required**	N	N	N	Y**

* In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.

** In Flood Zone 3b (functional floodplain) essential infrastructure that has to be there and has passed the Exception Test, and water-compatible uses, should be designed and constructed to:

- Remain operational and safe for users in times of flood.
- Result in no net loss of floodplain storage.
- Not impede water flows and not increase flood risk elsewhere.

6.14 Table 6.3 cannot be taken as the final answer to whether or not a development is appropriate; the Sequential Test and the Exception Test, where necessary, must be completed in full for all sources of flood risk.

6.15 The Sequential and Exception Tests do not need to be applied to minor developments and changes of use, except for a change of use to a caravan, camping or chalet site, or to a mobile home or park home site.

6.16 Some developments may contain different elements of vulnerability and the highest vulnerability category should be used, unless the development is considered in its component parts.

6.17 As shown in Table 6.3, the Exception Test should be applied in a number of instances. Application of the Exception Test ensures that new developments which are needed in medium or high flood risk areas will only occur where flood risk is clearly outweighed by other sustainability benefits and the development will be safe for its lifetime, taking climate change into account.

6.18 For the Exception Test to be passed:

- It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a SFRA where one has been prepared, and
- A site specific flood risk assessment (FRA) must demonstrate that the development will be safe from all sources of flood risk, will not increase flood risk elsewhere, and, where possible, will reduce flood risk overall. Please see the DEFRA/EA publication *Flood Risks to People* for further information on what is considered 'safe .

6.19 Both elements of the test will have to be passed for development to be permitted. The assessment of wider sustainability benefits should refer to the Local Plan's Sustainability Appraisals, which identify key sustainability issues and objectives for each district.

6.20 Any development undertaking the Exception Test should demonstrate the sustainability issues that the proposal is seeking to address. The general provision of housing by itself would not normally be considered as a wider sustainability benefit to the community which would outweigh flood risk; however confirmation should be sought from the LPA. Examples of wider sustainability benefit to the community that would be considered could include the regeneration of an area, or the provision of new community facilities such as green infrastructure, woodland community centres, cycleways, footways or other infrastructure which allow the community to function in a sustainable way.

7 Site Specific Flood Risk Assessments

When is a Site Specific Flood Risk Assessment Required?

7.1 A site-specific Flood Risk Assessment is required:

- For proposals of 1 hectare or greater in Flood Zone 1
- For all proposals for new development (including minor development and change of use) in Flood Zones 2 and 3
- In an area within Flood Zone 1 which has critical drainage problems (as notified to LPAs by the EA)
- For any proposal in a Critical Drainage Area as identified in the SFRA, and
- Where proposed development, or a change of use to a more vulnerable class, may be subject to other sources of flooding

7.2 A Flood Risk Assessment may also be required for some other specific situations:

- If the site may be at risk from the breach of a local defence
- Where the site is intended to discharge to the catchment or assets of a WMA which requires a site-specific Flood Risk Assessment
- Where evidence of historical or recent flood events requires a Flood Risk Assessment, and
- In an area of medium or high risk of surface water flooding. High Risk means that each year the area has a chance of flooding of greater than 3.3%. Medium risk means that each year this area has a chance of flooding of between 1% and 3.3%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.

7.3 When undertaking a Flood Risk Assessment, applicants are strongly encouraged to work closely with Water Management Authorities. WMAs must agree that proposed developments are safe and that flood risk management partners (e.g. emergency services) would be able to respond quickly and appropriately to any incidents. Site-specific Flood Risk Assessments must detail how a site will be made safe and include plans for emergency access, egress and evacuation.

Modelling and Mapping

7.4 The following flood related factors can influence the safe design of new developments and should be considered in the site s Flood Risk Assessment:

- Flood source
- Flood mechanism
- Predicted flood level
- Flood duration
- Frequency
- Velocity of floodwaters
- Debris
- Flood depth
- Amount of warning time

7.5 If developers need to undertake more detailed modelling for their sites to be able to accurately demonstrate the timings, velocity and depth of water inundation to their site, then it is recommended that the scope of works is discussed with the Environment Agency and the Lead Local Flood Authority.

Climate Change

7.6 Climate change should be taken into consideration as detailed in paragraphs 5.29 to 5.31.

7.7 For guidance, residential development should be considered for a minimum of 100 years, unless there is specific justification for considering a shorter period.

7.8 For proposals with exceptional vulnerability to flooding and/or an expected lifetime of over 100 years, consideration should be given in Flood Risk Assessments to the potential implications of climate change beyond 100 years. This may include an extended climate change horizon for phased developments. Pre-application discussions with relevant River Management Authorities are especially important in these cases.

7.9 For development other than residential, its lifetime will depend on the characteristics of that development. Applicants should justify why they have adopted a given lifetime for the proposed development when they are formulating their Flood Risk Assessment. It would need to be demonstrated with a degree of certainty that the building will no longer be present on the site for a lesser amount of climate change allowance to be used in the design calculations.

Site Layout

7.10 The site layout of any proposed development should take into consideration areas of flood risk present on the site and this should influence the choice of where to locate elements of the proposed development including sustainable drainage systems (SuDS) and Natural Flood Management (NFM) measures. This is in line with the Sequential Approach to flood risk. If areas of flood risk cannot be avoided then the least vulnerable elements of the proposed development should be located to coincide with the highest level of flood risk. This principle should be implemented when considering existing or post-development fluvial and pluvial flood flow routes, attenuation exceedance routes and drainage infrastructure exceedance routes.

7.11 The site layout should also respond to the characteristics of the location and the nature of the risk. In some areas it is more appropriate to make space for water and allow controlled flood water onto areas of the development site, using SuDS and NFM measures where practicable. This is particularly relevant to riverside developments where extreme events can be catered for in multi-function open space areas (likely to form part of the green infrastructure provision) that would normally be used for recreation but infrequently can flood.

7.12 Short-term car parking may be appropriate in areas subject to flood risk provided that flood warnings and signs are in place. It is important to consider the need that people should be able to move their cars to a recognised safe area within the warning time (hence the unacceptability of long term and residential car parking where residents may be away from the area for long periods of time). Car parks should ideally not be subject to flood depths in excess of 300mm depth since vehicles can be moved by water of this depth and may cause obstruction and/or injury. A guidance document titled *Flood Risks to People* was published by DEFRA / EA in 2006 which developed a method for estimating risks to people, both during and immediately after a flood event. This document contains useful information on the hazards of flooding.

7.13 The use of SuDS or Natural Flood Management should not be sited within the flood plain where implemented to manage surface water flows as they are important in reducing the risk of surface water flooding on site and cannot be utilised if flooded from the river. Additionally, the river will want to fully use its floodplain and these systems in the floodplain may compromise this ability.

Floor Levels

7.14 Raised floor levels are the primary design flood mitigation measure for new development. The expectation is that finished floor levels should be raised above the 1 in 100 year return period flood event level, plus an appropriate allowance for climate change (see most up to date climate change guidance), plus a freeboard allowance for uncertainty (e.g. 300mm for less vulnerable uses and 600mm for more vulnerable uses). However, if historical flood levels are available, then whichever is the highest should be used.

7.15 Where it is not possible to avoid flood risk or minimise it through site layout, raising site levels above the predicted flood level (including an appropriate allowance for climate change) is a possible option in some circumstances to manage flood risk to new developments. However, this can increase flood risk elsewhere; it can create an ‘island effect with surrounding areas inundated during a flood; make access and egress difficult; can affect river geomorphology; it can have further potential impacts, such as erosion on site and changes to erosion and sedimentation elsewhere and can also have an impact on the landscape value and amenity of the river flood plain. The impact of raising levels should be covered as part of carrying out a Flood Risk Assessment.

7.16 Raising the site and floor level may not be appropriate in all situations and should not be seen as a development wide solution, but may be considered alongside other solutions if acceptable to the LPA and other Water Management Authorities (WMAs). It is important that the design will ensure that safe access and egress will always be available and this will be an essential part of the ongoing maintenance and legal agreements for the development. Please see the Defra/EA publication ‘Flood Risks to People for further information on what is considered ‘safe for the lifetime of the development.

7.17 An alternative could include the placing of parking or other flood compatible uses at ground level with more vulnerable uses at higher levels. This is only appropriate for areas of low frequency flood risk and must ensure safe

access and escape from the development and that the development is habitable for the duration of the flood, i.e. services to the properties will continue to function. When undertaking this approach no built elements should interrupt flood flow paths or reduce floodplain storage capacity.

7.18 Single-storey residential development and ground floor flats are generally more vulnerable to flood damage as occupants do not have the opportunity to retreat to higher floor levels. For this reason single storey housing, ground floor flats and sleeping accommodation on the ground floor in buildings with more than one storey in flood risk areas should not be allowed. An exception to this may be when finished floor levels are set above the appropriate flood level for the lifetime of the property (taking into account the appropriate climate change allowance), and there is safe access and escape.

7.19 Sleeping accommodation on the ground floor that relies on flood warnings and the implementation of flood proofing measures is hazardous. Residential uses in basements in flood risk areas are not recommended and should be avoided. Change of use from commercial to residential that results in proposed ground floor flats in Flood Zone 3 is unlikely to be acceptable unless finished floor levels are or can be raised above the predicted flood level (with an appropriate allowance for climate change), and there is safe access to and escape from higher storeys of the building.

Compensatory Storage

7.20 Any proposals to modify ground levels will need to demonstrate in the Flood Risk Assessment that there is no increase in flood risk from all sources to the development itself or to any existing property elsewhere. Where land on site is raised above the level of the flood plain to protect properties, compensatory land must be returned to the floodplain. This is to ensure that new flood risk is not created elsewhere in an unknown or unplanned for location. Land raising would generally only be applicable on smaller development sites or for a small portion of the developable site area.

7.21 For undefended sites, floodplain compensation must be both ‘level for level and ‘volume for volume . Direct (onsite or opposite bank) flood compensation is preferable since it is more appropriate, more cost effective and will ensure it functions correctly. If strategic off-site upstream flood compensation is to be considered, developers should liaise with the LPA, the EA to understand whether storage sites are available that could protect multiple developments, potentially lead to shared costs, and reduce flood risk overall. CIRIA s report C624 entitled ‘Development and Flood Risk - Guidance for the Construction Industry (2004) provides detailed advice on floodplain compensation.

7.22 In defended areas, developers should assess the risks to the site and surroundings and undertake mitigating action if the raising of land has the potential to create additional risk elsewhere. Consultation should be undertaken with WMAs (e.g. the EA and LLFA) to determine what type of flood compensation or other mitigating actions would be appropriate.

New Flood Defences

7.23 The construction of new flood risk defences may enable development to take place provided that there are wider sustainability benefits associated with their construction. New defences create new residual risks that can take significant investment to fully understand and plan. Where defences are required, maintenance agreements will need to be reached through Section 106 of the Town and Country Planning Act 1990. In addition, Calderdale Council may also adopt new flood defences if appropriate agreements and funding are in place.

Typical Requirements of a Flood Risk Assessment

7.24 Site-specific flood risk assessments should always be proportionate to the degree of flood risk and make optimum use of information already available.

7.25 It should be noted that the Environment Agency remains a statutory consultee for all development at risk of flooding from rivers and the sea, defined as Flood Zones 2 and 3. They should be consulted as early in the development planning process as possible.

7.26 Environment Agency permission through a flood risk activity permit will also be required for any works that might affect a main river or flood defence.

7.27 As a guide, FRAs should cover the following areas as a minimum:

Site description

This should include information with regard to the size and location of the site and also the location of any structures that could affect water flow. The following plans must be submitted:

- The location of the site
- The layout of the existing site including roads, buildings and any water body including rivers, streams, ponds and wetlands
- Topographical survey information for the existing site to Ordnance Datum
- Details of the proposed development including proposed levels and cross sections through the site
- Relevant Information regarding the hydrology, geology and hydrogeology of the site

Assessment of flood risk

As a minimum the following should be considered and relevant information stated:

- Flood zone for the site
- Impacts of Climate change
- Sequential test and exception test
- Flood risk from all sources
- Flood risk to and from the development

Surface water runoff

FRAs must assess surface water runoff from the site and provide the following information:

- An estimate of the amount and rate of surface water runoff from the site
- Details of any existing methods for managing surface water on the site eg draining to a sewer
- Proposed methods for managing the surface water and making sure there is no increase in the level of surface water runoff

A surface water drainage strategy should be developed for the proposed site in conjunction with the FRA and submitted at the same time.

Measures to manage flood risk

7.28 Measures to manage flood risk from all sources should be stated. The selection of appropriate mitigation measures depends on the requirements of the development and its sensitivity to flood risk. Any mitigation measure selected should be sustainable in the future by taking into consideration the impact of climate change on flood risk.

Measures to manage residual flood risk

7.29 Measures to manage the residual flood risk from all sources should be stated.

Environment Agency Standing Advice

7.30 You should follow the Environment Agency s standing advice if you are carrying out a Flood Risk Assessment of a development classed as:

- A minor extension (household extensions or non-domestic extensions less than 250 sq m) in Flood Zones 2 or 3
- ***More vulnerable*** in Flood Zone 2 (except for landfill or waste facility sites, caravan or camping sites)
- ***Less vulnerable*** in Flood Zone 2 (except for agriculture and forestry, waste treatment, mineral processing, and water and sewage treatment)
- ***Water compatible*** in Flood Zone 2

7.31 You also need to follow standing advice for developments involving a change of use into one of these vulnerable categories, or into the water compatible category.

Flood Risk Assessment Checklist

7.32 The table below provides a guide to ensure relevant steps have been completed as part of drafting the Flood Risk Assessment.

Table 7.1 Checklist for Completing an FRA

Item	Notes
Development within 20m of a main river?	Contact the Environment Agency if so
Have you reviewed all available datasets?	
Is the Sequential Test required?	If so should be included in FRA
Is the Exception Test required?	If so should be included in FRA
Has a climate change assessment been carried out?	Include in FRA
Has flood risk from all sources been covered?	
Has compensatory storage been considered?	
Has flood risk mitigation been addressed?	
Surface Water Runoff	Surface Water Drainage Strategy should be undertaken and submitted with FRA
Has residual flood risk been addressed?	

8.1 Residual risks are those remaining after the Sequential Approach has been applied to the layout of the different site uses and after specific measures have been taken to control the flood risk. At this stage management measures are no longer about reducing the risk, but about planning for flooding. Management of the residual risk must therefore be the very last stage of designing and planning a site, where all options for removing and reducing risk have already been addressed.

8.2 This document only provides an overview of residual risk related management measures. More detailed information is included in 'C688 - Flood resilience and resistance for critical infrastructure (CIRIA, 2010)' and its supporting documents, 'Improving the Flood Performance of New Buildings – Flood Resilient Construction (CLG, 2007)' and 'Flood resilient building (BRE DG 523)'.

8.3 Where flood defence and drainage infrastructure has been put in place there will be risks associated with both its failure and with the occurrence of flood events more significant than the design level of the defence or system. These are residual risks which can be managed. The costs of managing residual risk may be low compared to the damage avoided. It should be noted that climate change is expected to increase the level of residual risk.

8.4 Different types of measures to manage residual risk include:

- Developer contributions towards publicly funded flood alleviation schemes
- Designing sustainable drainage systems so that storm events which exceed the design standard are properly planned for and the exceedance routes are known and appropriate
- Incorporating flood resistance and resilience measures into building design
- Flood warning and evacuation plans

8.5 There are two main strategies for managing property level flood risk:

- Water exclusion strategy – where emphasis is placed on minimising water entry whilst maintaining structural integrity, and on using materials and construction techniques to facilitate drying and cleaning. This strategy is favoured when low flood water depths are involved (not more than 0.6m). It should be noted that even with this strategy, water is still likely to enter the property.
- Water entry strategy – where emphasis is placed on allowing water into the building, facilitating draining and consequent drying. Standard masonry buildings are at significant risk of structural damage if there is a water level difference between outside and inside of about 0.6m or more. This strategy is therefore favoured when potentially high flood water depths are involved (greater than 0.6m).

Flood Resistance Measures

8.6 Flood resistance measures reduce the risk of flood water from entering a building and can be referred to as ‘dry proofing . Measures include exterior water retaining walls and barriers built into building facades, gates that protect basement areas, doorway flood barriers, and airbrick covers.

8.7 The effectiveness of flood resistance measures depends upon the occupier understanding the features, utilising them correctly when required and carrying out any needed maintenance. Passive measures such as flood doors and self-closing airbricks are one way of reducing the risk. Water pressure and carried debris can also damage buildings and result in breaching of barriers. As a result these measures should be used with caution and accompanied by flood resilience measures.

8.8 Flood resistance measures cannot be used in isolation as the only form of flood mitigation, but they may be useful within a suite of measures including appropriate high finished floor levels and safe access and escape routes. Flood resistance measures can aid recovery from an extreme event.

Flood Resilient Construction

8.9 Flood resilient construction accepts that water will enter the building, but with careful design minimises the damage to allow the re-occupancy of the building as soon as possible. This is encouraged in water compatible developments within the functional flood plain. Resilient construction can be achieved more consistently than resistance measures and is less likely to encourage occupiers to remain in buildings that could be inundated by rapidly rising water levels. Total prevention of water entry or ‘dry proofing to a building is very difficult to achieve and flood resilient measures are about reducing the impact caused by flooding. Further details can be found in Improving the *Flood Performance of New Buildings* (DCLG, 2007).

Other Measures to Manage Residual Flood Risk

8.10 Other measures also include information based actions and planning such as:

- The use of clear signage within a development to explain the remaining risks or required responses from residents in the event of a flood
- Evacuation pathways and routes should be clearly signed, and where possible, markers (colour coded) used on bollards/lampposts to define the path and changes in depth from shallow to deep for the users. Any chamber covers should not be designed within access routes as covers can lift during floods and become hazardous to pedestrians.
- Ensuring that appropriate flood insurance is available and is in place for buildings and contents
- Businesses developing and maintaining business continuity plans. It is encouraged that business continuity planning is undertaken across all risk areas
- Preparing and acting on flood warning and evacuation plans. These plans are an essential part of managing the remaining risk. Particular attention should be given to communicating warnings to and the evacuation of vulnerable people.

8.11 The areas of Calderdale covered by the EA s flood warning scheme can be viewed on the EA s online map. While this scheme provides prompt telephone calls and SMS text messages to registered individuals, it is dependent on residents signing up to the scheme. Developers must also bear in mind that warning areas may not be extended to cover new development areas. The EA s scheme only covers flooding from main rivers. Flooding from rainfall, surface runoff and groundwater often occur much more quickly, making warning more difficult. No specific local or national warning system currently exists for these more localised events and developers will need to consider this in ensuring developments will be safe from all sources of flooding.

9.1 Where the existing site drainage is to be modified in any way, or new surface water drainage is to be provided, a Drainage Strategy should be submitted alongside the Flood Risk Assessment (or as a stand-alone document where a Flood Risk Assessment is not required.)

Types of Sites

- Greenfield – Sites that are previously undeveloped
- Brownfield – Sites that have been developed previously – it is important that details of any existing drainage and existing positively drained areas are obtained by undertaking appropriate survey work
- Mixed – Sites that have a combination of Greenfield and Brownfield drainage uses (i.e. sites with part existing development / part open greenfield) should not be treated as wholly brownfield developments in terms of drainage and should assess the two areas separately as greenfield or brownfield, based on existing drainage connections or not. The site as a whole should still use only one outfall with one combined peak flow restriction, subject to site constraints.

Requirement of SuDS

9.2 Local planning policies and decisions on planning applications in relation to major developments and all developments in flood risk areas are to ensure that sustainable drainage systems for the management of run-off are put in place, unless demonstrated to be inappropriate.

9.3 Local Planning Authorities are expected, when considering planning applications, to:

- Consider SuDs in connection with the planning application
- Consult the relevant Lead Local Flood Authority on the management of surface water
- To satisfy themselves that the proposed minimum standards of operation are appropriate, and
- Ensure through the use of planning conditions or planning obligations (Section 106 agreements) that there are clear arrangements in place for ongoing maintenance over the lifetime of the development. The operation and ongoing maintenance of SuDS must also be economically proportionate.

9.4 Calderdale Council's Flood Risk Team will consider adoption of SuDS where appropriate under relevant agreements such as a maintenance agreement under Section 106 of the Town and Country Planning Act 1990. Calderdale LLFA will be considering the adoption of SuDS features once Section 3 of the FWMA 2010 is enacted and the SAB team is in a position to do so.

Pre-application Advice

9.5 Incorporating appropriate drainage is easier and more sustainable if it is planned and designed in from the start of a development. Calderdale Council encourages pre-planning consultation to ensure that the issues are appropriately addressed at an early stage.

9.6 The participation of other consenting bodies (particularly statutory consultees) in pre-application discussions should also be undertaken whenever possible to enable early consideration of all fundamental issues, even when further discussions will be required at a later stage. These agencies or bodies may include (but not be limited to):

- Environment Agency
- Canal and River Trust
- Highway Authority
- Yorkshire Water (sewage undertaker)

9.7 Calderdale Council's Flood Risk Team, in its role as Lead Local Flood Authority, is consulted by the Local Planning Authority on all major developments and relevant minor applications and will provide comments in relation to flood risk and the surface water drainage strategy.

Drainage Strategy Development

9.8 The drainage strategy should consider sustainable drainage techniques that work with the natural drainage of the site to retain surface water within the site and manage the risk of flooding during severe storms (both on and off-site).

9.9 It is important to identify and consider constraints which may impact the manner in which drainage is provided on site. The drainage strategy should take account of existing flow routes, either by incorporating them into the drainage system or designing the layout appropriately.

9.10 During the assessment of any site, full reference should be made to any existing flood risk management information that may be available. Accordingly, evidence from the Strategic Flood Risk Assessment should be taken into consideration.

9.11 If it has been previously identified that the site or its immediate surroundings are susceptible to flooding from any source, the site layout and drainage design should take the existing risk fully into account. Similarly, if there are any constraints to the utilisation of infiltration (e.g. contaminated land, source protection zones or high groundwater), the drainage design should take these into account.

9.12 When water draining from a site leaves the development, the water may flow through a variety of watercourses or surface water sewers before reaching its destination. The rate and quality of flow can therefore easily affect locations downstream. For this reason a drainage strategy must take a catchment or sub-catchment based approach and consider the route and impacts of flows after they leave a development site.

9.13 Ground conditions such as instability or contamination can have a significant effect on the design of a site drainage system. For this reason testing should be carried out before the initial planning application submission so that it can be established whether the results will affect flood risk management, drainage or site design. Increases in or the spread of contamination must be avoided.

9.14 The adopting authority should clearly be stated for all aspects of drainage infrastructure stated in the drainage strategy. Where possible pre-application enquiries should be made with the relevant WMA.

Minimum Hydraulic Performance of All Drainage Systems

9.15 Adequate hydraulic calculations together with drawings showing pipe numbers and contributing area should be provided to the Local Planning Authority with the full application submission to demonstrate that the completed site surface water drainage system from all roof and paved areas will accommodate the following design parameters:

- No system surcharge during a 1 in 2 year storm plus 30% for climate change
- No surface flooding during a 1 in 30 year storm plus 30% for climate change
- No internal flooding to property including access and egress areas during a 1 in 100 year storm plus an appropriate allowance for climate change unless otherwise addressed in the approved Flood Risk Assessment

SuDS and Planning

9.16 As part of the government s continuing commitment to protect people and property from flood risk, it expects local planning policies and decisions on planning applications relating to major development to ensure that sustainable drainage systems for the management of run-off are put in place, unless demonstrated to be inappropriate.

9.17 The variety of SuDS techniques available means that virtually any development should be able to include a scheme based around these principles. This should not be a piecemeal use of a few techniques. A fully integrated system is essential.

9.18 Some SuDS options could require significant land-take so it is essential that they are considered early on in the design process. SuDS solutions are also available for high density urban environments where space is at a minimum. It can be difficult to incorporate some options once the detailed development design is underway.

9.19 Sustainable drainage systems are designed to control surface water run-off close to where it falls and mimic natural drainage as closely as possible. They provide opportunities to:

- Reduce the causes and impacts of flooding
- Remove pollutants from urban run-off at source
- Combine water management with green space with benefits for amenity, recreation and wildlife

9.20 The expected increase in intense rainstorms (as a predicted result of climate change) and the nature of traditional drainage means that the likelihood of surface water flooding will increase over time in Calderdale, with

or without development. Existing drainage systems are generally not designed to cater for more significant rainfall events (those greater than a 3.33% probability).

9.21 Loss of permeable (porous) ground through development, extensions and paving, will also increase surface runoff flow rates and associated flood risk. Therefore the Council requires the drainage systems for all scales of development to be 'sustainable and include a 10% increase for urban creep applied to the impermeable area of the proposed development. In this context the Council defines this as minimising flood risk, improving water quality, bringing wider benefits other than just site drainage (improved local environment and biodiversity and a safe public amenity) and being maintainable over the long-term.

9.22 The combination of urban creep, climate change and historic design standards highlight why it is important that redevelopment will require improvements from the existing site water management to ensure flood risk is not allowed to increase over time and a standard of protection is sustained.

9.23 Retrofitting of sustainable drainage systems (SuDS) particularly in the urban area is also something that the Council is looking to promote where possible.

9.24 For planning permission, the Council must be content that the development will not increase risk from any sources of flooding and that it has an appropriate sustainable drainage system approved. An organisation adopting SuDS will have their own specific requirements about how the system will function, its construction and how it will be maintained. The requirement of such information will be set outside of the planning process.

9.25 By using this SPD to assist with the designing of sites for planning permission it should be possible to avoid late consideration of the flood risk and drainage during the site design process which can result in trying to find space for water and lead to expensive solutions.

Calderdale SuDS Design Principles

9.26 West Yorkshire Combined Authority has published a brief introduction to sustainable drainage systems and techniques, WYCA SuDS Guidance Appendix B. The aim of this document is to provide guidance on the information that should be included with a planning application in order to promote the use of sustainable drainage systems in new developments. This SPD sets to expand on the WYCA introductory guidance.

9.27 Designing SuDS effectively requires an interdisciplinary team with a range of skills such as planning, drainage engineering, landscape design and biodiversity knowledge. SuDS in Calderdale should be designed by a competent design team that works together from the outset to deliver a successful scheme. In many cases, overall cost savings can be realised where multiple benefits such as improved open spaces, recreational areas and surface water drainage function in one area.

9.28 The following SuDS design principles are expected to have been considered when designing a sustainable drainage system:

- Priority should be given to soft SuDS techniques with the aim of achieving multiple Green Infrastructure benefits
- A complete sustainable drainage system should be suitably sited and meet all parts of the SuDS treatment train. This is to ensure that the system functions exactly as it should and achieves the intended benefits.
- The number of treatment stages within a drainage system must be appropriate to the uses on site
- The full range of SuDS techniques must be considered for all sites, including brownfield sites, with the most appropriate technique(s) taken forward
- All drainage strategies must demonstrate flow paths and exceedance routes, mimic natural drainage paths and include appropriate mitigation measures. Functionality of SuDS features should be ensured if sited in the functional flood plain.
- Allowances for climate change and urban creep must be factored into designs
- There should be appropriate storage incorporated within the site to allow for rain events up to a 1% annual probability (1 in 100) and an allowance for climate change
- Where applicable, previously culverted watercourses should be opened up to create more natural drainage and reduce the likelihood of bottlenecks/blockages that can occur and cause flooding in localised areas
- An appropriate maintenance plan should accompany the drainage strategy including all SuDS schemes, ensuring maintenance for the lifetime of the development. The ease of maintenance and access is an essential part of the design of sustainable drainage systems.

- As well as managing water quantity and quality, SuDS can and should enhance the wider environment by providing opportunities for a net gain in biodiversity and delivering public amenity. However it must be remembered that the primary function of SuDS is to effectively drain an area.
- The use of permeable surfaces on site (both green and paved) should be considered

9.29 For further information please refer to the most recent guidance on SuDS and any available future SUDS documents from the LLFA, CIRIA or EA.

SuDS Techniques

Table 9.1 Explanation of SuDS Techniques

SuDS component	Description	Further guidance on design
Source control		
Green roofs	Green roofs comprise a multi-layered system that covers the roof of a building or podium structure with vegetation cover/landscaping/permeable car parking, over a drainage layer. They are designed to intercept and retain precipitation, reducing the volume of runoff and attenuating peak flows. Some important design considerations include accessibility, biodiversity objectives, amenity and desired visual impact, structural considerations such as the saturated weight of the system and the bearing capacity of the roof structure, the need for rooftop equipment like vents and air conditioning systems, management of drainage and maintenance requirements.	Chapter 12 of the CIRIA SuDS Manual C753
Soakaways	Excavations, filled with aggregate or lined with brickwork, or pre-cast storage structures surrounded by granular backfill, designed to store runoff until it infiltrates into the surrounding soils. Many smaller soakaways are now constructed with geocellular units which are available from builders' merchants and allow the size of the structure to be minimised. For larger developments it may be more appropriate to construct soakaways using perforated precast manhole rings. One advantage of this method is access for inspection and maintenance.	See Chapter 13 of the CIRIA SuDS Manual C753 and BRE DG 365 for guidance on the design of soakaways. All soakaways design calculations must be in accordance with BRE DG 365 and meet the minimum hydraulic criteria stated in Section 9.15 above.
Filter strips	Filter strips are vegetated strips of land designed to accept runoff as overland sheet flow from upstream development, provide a degree of filtration and retention by the vegetation and soil, and convey excess runoff onwards to more suitable storage or infiltration techniques. Careful attention should be paid to the design of the filter strips to ensure consistent performance.	Chapter 15 of the CIRIA SuDS Manual C753

SuDS component	Description	Further guidance on design
Source control		
Water butts / rainwater harvesting	Rainwater harvesting is the process of collecting and using rainwater that would otherwise have gone into the drainage system or been lost through evaporation.	Chapter 11 of the CIRIA SuDS Manual C753
Permeable paving	Permeable or pervious surfacing provide a pavement suitable for pedestrian and/or vehicular traffic, while allowing rainwater to infiltrate through the surface and into the underlying layers. The water is temporarily stored before infiltration to the ground, reuse, or discharge to a watercourse or other drainage system.	Chapter 20 of the CIRIA SuDS Manual C753
Site control		
Swales	Swales are linear vegetated drainage features in which surface water can be stored or conveyed. They can be designed to allow infiltration, where appropriate. They should promote low flow velocities to allow much of the suspended particulate load in the storm water runoff to settle out, providing effective pollutant removal.	Chapter 17 of the CIRIA SuDS Manual C753
Detention basins	Detention basins are surface storage basins or facilities that provide flow control through attenuation of storm water runoff. They also facilitate some settling of particulate pollutants. Detention basins are normally dry and in certain situations the land may also function as a recreational facility.	Chapter 22 of the CIRIA SuDS Manual C753
Infiltration basins	Infiltration basins are vegetated depressions designed to store runoff and infiltrate it gradually into the ground.	Chapter 13 of the CIRIA SuDS Manual C753
Regional control		
Retention ponds	Ponds can provide both stormwater attenuation and treatment. They are designed to support emergent and submerged aquatic vegetation along their shoreline. Runoff from each rain event is detained and treated in the pool.	Chapter 23 of the CIRIA SuDS Manual C753
Wetlands	Wetlands provide both stormwater attenuation and treatment. They comprise shallow ponds and marshy areas, covered almost entirely in aquatic vegetation. Wetlands detain flows for an extended period to allow sediments to settle, and to remove contaminants by facilitating	Chapter 23 of the CIRIA SuDS Manual C753

Regional control		
	adhesion to vegetation and aerobic decomposition. They also provide significant ecological benefits.	

Hierarchy of Surface Water Disposal

9.30 The destination of surface water runoff that cannot be used, prevented or dealt with at source must always consider the discharge hierarchy. The applicant should demonstrate compliance with the hierarchy. This will comprise an assessment to dispose of waters from all roof and paved areas via:

- Disposal to ground via infiltration. Where this is not practicable,
- Disposal to a watercourse. Where this is not practicable,
- Disposal to a surface water sewer or highway drain. Where this is not practicable,
- Disposal to a combined sewer

Initially the site should be investigated for its suitability for infiltration drainage techniques as a means of disposing surface water. Only if this proves impracticable, or other mitigating reasons, should the lesser disposal methods be considered in priority order. Any sustainable drainage system features should be designed in accordance with SuDS Manual C753.

Discharge by Infiltration

Hydraulic design requirements

9.31 If soakaways are proposed then percolation tests results complete with calculations (in accordance with BRE DG 365 and meeting the minimum hydraulic criteria set out in Section 7.15 above) will be required by the Local Planning Authority to confirm that the correct capacity of soakaway will be provided. Water-logging or the potential for nuisance to adjacent areas including through groundwater bleed should also be considered. The soakaway should be designed to include runoff from all roof and paved areas and to accommodate the hydraulic criteria.

Structural design requirements

9.32 A full ground investigation should be undertaken to assess the ground conditions and ensure appropriate structural design of the infiltration system.

Site constraints

9.33 Soakaways should not be located within 5 metres of a building, the public highway, a retaining wall/structure, in areas of unstable land or where the discharge could drain into a closed landfill site and potentially increase landfill gas production.

Discharge to Watercourse

9.34 Surface water discharge to the watercourse should only to be considered if infiltration as a means of surface water disposal proves impractical. It must be proven on site that a site benefits from an existing connection to a watercourse or culverted watercourse to prove a positive drainage route, this should be done by a condition survey and/or CCTV survey of the existing system, with details of the outfall and receiving watercourses condition and hydraulic capacity.

9.35 It cannot be assumed that a site benefits from an existing connection to a downstream / downslope culverted watercourse without proving the existing drainage infrastructure and connection from the development site.

9.36 If no existing connection can be proven from a development site, the site should be treated as a new contributing flow to the receiving watercourse, restricted to the greenfield runoff rate, equivalent to the development site s area.

9.37 It should also be noted that works to a watercourse (culverted or open watercourse) will also require an Ordinary Watercourse Consent (OWC) from the LLFA. This is outside of the planning system and a separate OWC application is required.

Hydraulic design requirements

9.38 Discharge to a watercourse is subject to the applicant investigating the receiving watercourse to ensure that it is hydraulically adequate downstream to the nearest open outfall and to provide the Local Planning Authority with a report of the findings for comment.

9.39 Both new and existing connections to a watercourse will also require a condition survey of the receiving watercourse to confirm the watercourse is in adequate condition. Furthermore the receiving watercourse will need to be modelled for its hydraulic capacity to confirm that it can receive the additional flows form the development site.

9.40 If no details of the new/existing connections to a watercourse are provided, such as a condition and capacity assessment of the receiving watercourse, the LLFA s will not approve or condition a development planning application with a watercourse connection until an adequate survey is received.

Structural design requirements

9.41 Any receiving watercourse should be investigated by the applicant to ensure the structural integrity for the design life of the development.

9.42 Both new and existing connections to a watercourse will also require a condition survey of the receiving watercourse to confirm the watercourse is in adequate condition. Furthermore the receiving watercourse will need to be modelled for its hydraulic capacity to confirm that it can receive the additional flows from the development site.

Allowable discharge

9.43 The discharge to the watercourse is to be limited to the greenfield runoff (Qbar) calculated in accordance with the latest guidance from the EA for greenfield runoff estimation, this is to use the FEH database or the Institute of Hydrology Document 124 or 2.5 ltrs/sec/ha for up to and including the 1 in 100 year storm event plus an allowance for climate change, whichever the greater.

9.44 If it can be demonstrated that a previously developed site has an existing connection to a watercourse and the receiving watercourse is proven to have an acceptable condition and hydraulic capacity for the development site flows, then the existing discharge rate minus a minimum of 30% will be permitted. If the receiving watercourse cannot be proven to have an acceptable condition or available hydraulic capacity, then the existing discharge rate minus a minimum of 50% will be permitted.

9.45 The proposed flow rate from a development will need to be agreed before the proposed drainage scheme will be approved or conditioned by the LLFA within the planning process. This will need to be in accordance with the appropriate greenfield/brownfield runoff rate estimation techniques.

Site constraints

9.46 When considering the development/redevelopment of any site, existing ordinary watercourses should be identified and accommodated within any drainage strategy and site masterplan, this should also include for any culverted watercourse within or adjacent to the site. They should be preferably retained as an open feature within a designated corridor, and ideally retained within public open space. Any outfall to an ordinary watercourse should be designed to ensure there is adequate erosion protection for the receiving channel and its banks.

Other consents and considerations

9.47 Discharging to a main river will require flood defence consent from the Environment Agency. Such consent is separate from any planning permission granted or any other approval/consent obtained.

9.48 Under Section 23 of the Land Drainage Act, any works to an ordinary watercourse - every river, stream, ditch, drain, cut, dike/dyke, sluice, sewer (other than a public sewer) and passage through which water flows and which does not form part of a main river - will require consent from the Lead Local Flood Authority, prior to works

on the watercourse commencing. This is required for both temporary and permanent works and is separate to any planning permission granted or other consents issued.

Discharge to Private and Public Sewers

Hydraulic design requirements

9.49 The applicant should undertake sufficient investigations to ensure the receiving sewer is hydraulically adequate to receive the proposed flows from the development.

9.50 Under the Private Sewer Transfer Regulations, June 2011, all private foul, combined and most surface water drains that serve two or more properties or pass from one curtilage into another, up to that date, became public sewers and to be maintainable by the relevant water company. It is highly likely that all drains and pumping stations constructed after that date, and that comply with the regulations, will also be adopted at some point in the future. Yorkshire Water Services currently specify Sewers for Adoption as their design guide for drainage systems and the water company should be contacted for advice in relation to this application.

Structural design requirements

9.51 The applicant should undertake sufficient investigations to ensure the receiving sewer is structurally adequate to receive the flows and is free from blockages and other structural defects.

Allowable discharge

9.52 The applicant should only consider this option if disposal of waters through more sustainable options have been ruled out.

9.53 Surface water discharge from Brownfield sites to a private sewer should be limited to the existing 1 in 1 year storm event rate minus a minimum of 30% peak flow. This rate should be the discharge rate for surface water for all storm events up to and including the 1 in 100 year plus an appropriate allowance for climate change

9.54 Surface water discharge from Brownfield sites to a public sewer should be limited to the existing 1 in 1 year storm event rate minus a minimum 30% peak flow unless advised to the contrary by the water company. This rate should be the discharge rate for surface water for all storm events up to and including the 1 in 100 year plus an appropriate allowance for climate change. For small developments an unrestricted outfall to the sewer may be permitted by Yorkshire Water Services and in this case the applicant should provide a copy of the agreement to the Local Planning Authority for confirmation.

Site constraints

9.55 Piped infrastructure should be located under highways where possible to allow for easy access and future maintenance.

Other consents and considerations

9.56 For discharge to private sewers the applicant should obtain written agreement from other landowners for pipes and manholes to be constructed on their land and that the agreement includes for the discharge of liquids though them. A copy of the agreement should be provided to Local Planning Authority for comment as the drain is likely to become a public sewer and may require inclusion as a covenant on the title deeds of their land until then. If a sewer requisition is to be made then a copy of the agreement should be provided to the Local Planning Authority.

9.57 For discharge to the public sewer if disposal of surface water, directly or indirectly, is proposed then the applicant may require Yorkshire Water Services' consent. The applicant is advised to make a pre-planning enquiry through Yorkshire Water s Developer Services Team.

Future Maintenance Requirements

9.58 The surface water drainage design should minimise maintenance requirements and health and safety should be appropriately managed as part of the design process.

9.59 The design should also consider Construction Design and Management (CDM) Regulations from the outset to ensure that access is provided for maintenance and that health and safety measures are adhered to.

9.60 Consideration should be given to access to and maintenance of existing infrastructure which includes existing ordinary watercourses. A maintenance strip 3 metres either side of the centreline of an ordinary watercourse should be provided, development in this area should be avoided

9.61 A drawing should be submitted showing ownership and maintenance liability of all drainage systems associated with the development.

9.62 For a SuDS scheme or features, a management and maintenance plan for the lifetime of the development should also be provided which should include the arrangements for adoption by any public authority or statutory undertaker and any other arrangements to secure the operation of the system throughout its lifetime. The plan should also outline the activities required for maintenance and inspection along with the recommended frequency of occurrence for each activity. In general, inspection and maintenance activities should be identified as follows:

- Regular – e.g. inspection, litter/debris removal, grass cutting, weed control, shrub management, aquatic vegetation management, sweeping permeable surfaces, filter replacement
- Occasional – e.g. sediment removal, vegetation/plant replacement
- Remedial – e.g. works in the event of erosion, spillage, vandalism

9.63 Those responsible for SuDS across a development should ideally be provided with an operation and maintenance manual by the designer and this could be part of the documentation provided under CDM. Aspects that should be included within the operation and maintenance manual are stated in CIRIA 753 and detailed below:

- Location of all SuDS components on site
- Brief summary of the design intent, how the SuDS components work, their purpose and potential performance risks
- Depth of silt that will trigger maintenance
- Visual indicators that will trigger maintenance
- Depth of oil in separators etc. that will trigger maintenance
- Maintenance requirements (i.e. maintenance plan) and a maintenance record pro forma
- Explanation of the objectives of the maintenance proposed and potential implications of not meeting those objectives
- Identification of areas where certain activities are prohibited (e.g. stockpiling materials on pervious surfaces)
- An action plan for dealing with accidental spillages of pollutants
- 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 affects SuDS, and
- Details of whom to contact in the event that pollution is seen in the system or if it is not working properly

Surface Water Submission Checklist

9.64 The tables below provide the minimum level of information required to be submitted to the LLFA, for minor and major applications, in order for the LLFA to be able to determine the drainage proposals/strategy and provide a consultation response to the LPA. This is not an exhaustive list and further information may be requested to support the application.

9.65 Information to discharge a condition should be submitted as one package rather than in piecemeal submissions.

Table 9.2 Minimum Submission for Minor Applications

Item	Pre-application	Outline Application	Full Application / Discharge of Conditions
Existing drainage survey	X	X	X
Existing impermeable area survey	X	X	X
Proposed scheme details and site layout	X	X	X
Proposed drainage layout		X	X
Hydraulic calculations			X
Ground investigation report (where infiltration proposed)		X	X
Evidence of Third Party Agreement for discharge to their system			X
Details of maintenance arrangements for the life of the design			X
Flood Risk Assessment (where required)		X	X

Table 9.3 Minimum Submission for Major Applications

Item	Pre-application	Outline Application	Full Application / Discharge of Conditions
Existing drainage survey	X	X	X
Existing impermeable area survey	X	X	X
Preliminary drainage layout		X	
Preliminary Hydraulic Calculations		X	
Soakaway Test Results		X	X
Ground investigation report (where infiltration proposed)		X	X
Evidence of Third Party Agreement for discharge to their system			X
Detailed layout drawings			X
Detailed hydraulic calculations			X
Details of maintenance arrangements for the life of the design			X
Flood Risk Assessment (where required)			X

Drainage Pro Forma

9.66 The surface water drainage pro forma, Appendix 3, is required to be completed for all major applications at outline and full/reserved matters stage. The pro forma should also be completed where a minor application could result in an increase in flood risk elsewhere as a result of the development.

Appendix 1: Major and Minor Development Definitions

Minor Developments

A1.1 A development is classed as minor for the following reasons:

- A development providing fewer than 10 houses; or
- The provision of dwelling houses where the development is to be carried out on a site of less than 0.5 ha and it is not known whether there are fewer than 10 houses or not; or
- The provision of a building or buildings where the floor space to be created by the development is less than 1000 sq m; or
- Development carried out on a site having an area of less than 1 ha

A1.2 The above criteria apply for sites falling within Flood Zone 1 and not within a Critical Drainage Area as defined within the Local Plan, or within an area with critical drainage problems as defined by the Environment Agency. Any development within a Critical Drainage Area or within an area with critical drainage problems should be classed as major development for the purpose of surface water drainage strategies and flood risk assessments. All developments in areas at risk of flooding - Flood Zones 2 and 3 - will need to incorporate sustainable drainage systems unless there is clear evidence that this will be inappropriate.

Major Developments

A1.3 Major developments include any development greater than the limits set out above or any minor development where there is a significant risk of surface water flooding.

Flood risk vulnerability classification

Essential infrastructure

- Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk
- Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood
- Wind turbines
- Solar Farms

Highly vulnerable

- Police and ambulance stations; fire stations and command centres; telecommunications installations required to be operational during flooding
- Emergency dispersal points
- Basement dwellings
- Caravans, mobile homes and park homes intended for permanent residential use
- Installations requiring hazardous substances consent. Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as 'Essential Infrastructure .

More vulnerable

- Hospitals
- Residential institutions such as residential care homes, children s homes, social services homes, prisons and hostels
- Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels
- Non–residential uses for health services, nurseries and educational establishments
- Landfill and sites used for waste management facilities for hazardous waste
- Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan

Less vulnerable

- Police, ambulance and fire stations which are not required to be operational during flooding
- Buildings used for shops; financial, professional and other services; restaurants, cafes and hot food takeaways; offices; general industry, storage and distribution; non-residential institutions not included in the 'more vulnerable class; and assembly and leisure
- Land and buildings used for agriculture and forestry
- Waste treatment (except landfill* and hazardous waste facilities)
- Minerals working and processing (except for sand and gravel working)
- Water treatment works which do not need to remain operational during times of flood
- Sewage treatment works, if adequate measures to control pollution and manage sewage during flooding events are in place
- Car Parks

Water-compatible development

- Flood control infrastructure
- Water transmission infrastructure and pumping stations
- Sewage transmission infrastructure and pumping stations
- Sand and gravel working
- Docks, marinas and wharves
- Navigation facilities
- Ministry of Defence installations
- Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location

- Water-based recreation (excluding sleeping accommodation)
- Lifeguard and coastguard stations
- Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms
- Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan

Calderdale Metropolitan Borough Council

Surface Water Drainage Pro Forma

In relation to surface water drainage, a development is classified as minor if any of the following apply:

- A development providing fewer than 10 houses
- A development to be carried out on a site having an area of less than 0.5 ha
- The provision of a building or buildings where the floor space to be created by the development is less than 1,000 sq m
- Development carried out on a site having an area of less than 1 ha

The above criteria apply for developments in Flood Zone 1. Any development in Flood Zones 2 or 3 should ideally be treated as major developments for the purpose of surface water drainage.

The pro forma should be considered alongside other SuDS guidance, but focuses on ensuring flood risk is not made worse elsewhere. The SuDs solution must operate effectively for the lifetime of the development, taking into account climate change. This pro forma is not exhaustive, so feel free to provide any additional supporting information. The following are links to SuDS Guidance:

CIRIA C753 The SuDS Manual

WYCA SuDS Guidance

It is important to note that a full drainage survey / topographical survey of the existing site should be undertaken prior to any works being undertaken. This is vital in demonstrating existing flows from the site, the existing means of disposal and flow routes across the site.

1. Applicant and Site Details

Major or minor development?	
Applicant:	
Address and Postcode:	
Site Address (if different):	
Telephone:	
Email Address:	
Grid Reference:	
Total site area served by drainage system (ha):	

Is topographical survey plan included? this should ideally show existing site layout, site levels and existing drainage system details.	
What is the site currently used for?	

1a. Ground Levels

Does the proposal involve raising the ground levels within any part of the site, including access roads? If so, please provide details. This would ideally be a plan showing existing and proposed levels or cross sections of the site showing existing and proposed levels.		
If built, could the development interrupt overland flows of water during very heavy rainfall? Please provide evidence to support this e.g. show on a plan. Environment Agency maps may indicate if the site is at risk of surface water flooding.		

2. Impermeable Area

	Existing	Proposed	Difference (Proposed - existing)	Notes
Impermeable Area (ha) - to be shown on a plan				If the proposed amount of impermeable surface is greater, then runoff rates and volumes will increase - Section 6 must be filled in. If the proposed impermeable area is equal or less than existing, then section 6 can be skipped and section 7 filled in.
Drainage Method – Infiltration, watercourse, sewer			N/A	If so, what is it? E.g. infiltration, watercourse, surface water sewer, combined sewer. A plan should be provided.

3. Proposed Surface Water Disposal Details

	Yes	No	Supporting evidence	Notes
Infiltration				e.g. soil percolation tests complete with calculations in accordance with BRE DG 365. Section 6 (infiltration) must be filled in if infiltration is proposed.
To watercourse				e.g. Is there a watercourse nearby? Please provide details of any watercourse to which the site drains including cross-sections of any adjacent water courses for appropriate distance upstream and downstream of the discharge point (as agreed with the LLFA). Works to a watercourse will require consent from the LLFA or a permit from the Environment Agency which is separate to any planning permission obtained.
To surface water sewer				If so, please give details. The watercourse should be checked to ensure that it is structurally and hydraulically adequate and details provided for comment. Confirmation is required from the sewerage provider that sufficient capacity exists. A pre-planning enquiry should be made with YW developer services.
To combined sewer				Evidence must be provided that this is the only viable option, in accordance with the SuDS hierarchy. Confirmation would also be required from the sewerage provider that sufficient capacity exists. A pre-planning enquiry

				should be made with YW developer services.
Has the drainage proposal given regard to the SuDS hierarchy?				Evidence should be provided that the SuDS hierarchy has been considered
Layout plan showing proposed locations of SuDS infrastructure?				Please provide plan reference numbers
Existing and proposed sewer calculations				Please provide supporting calculation with this application. Please refer to the guidance document for more information.

4. Peak Discharge Rates

(1)	Existing (l/s)	Proposed rates (l/s)	Difference (l/s)	Notes
Greenfield QBAR (mean annual flood flow rate in a river)				
1 in 1 year				
1 in 30 year				
1 in 100 year				
1 in 100 year plus an appropriate allowance for climate change				
Climate change allowance used:				

1. Peak discharge rate is the maximum flow rate at which storm water runoff leaves the site during a particular storm event http://www.uksuds.com/drainage-calculation-tools/greenfield-runoff-rate-estimation

5. Calculate additional volumes for storage

(1)	Existing volume (m^3)	Existing volume (m^3)	Difference (m^3)	Notes
1 in 1 year				
1 in 30 year				
1 in 100 year				

1 in 100 year plus an appropriate allowance for climate change				
Climate change allowance used:				

1. The total volume of water leaving the development site. New hard surfaces potentially restrict the amount of stormwater that can go into the ground. This needs to be controlled to prevent exacerbating flood risk downstream of the site and elsewhere.

Storage is required for the additional volume from site but also for holding back water to slow down the rate from the site. This is known as attenuation storage and long term storage. The concept is that the additional volume does not get into watercourses or receiving body, or if it does, it is at an exceptionally low rate. You can either infiltrate the stored water back to ground, or if this isn t possible hold it back with on-site storage. Firstly, is infiltration feasible on site?

State the site's geology:

6. Calculate additional volumes for storage

		Yes	No	Notes
Infiltration	Does the site have a high ground water table?			If yes, please provide details of the site s hydrology.
	Is the site within a known source protection zone?			Refer to http://apps.environment-agency.gov.uk/wiyby/37833.aspx
	Are infiltration rates suitable?			Infiltration rates should be no lower than 1x10 -6 m/s.
	Is the site contaminated? If so, consider advice from others on the feasibility of infiltration			Water should not be infiltrated through land that is contaminated. The Environment Agency made be able to provide advice.
	State the distance between a proposed infiltration device and the ground water level			A minimum of 1 metre should be provided between the soakaway base and the highest water table level to ensure groundwater doesn t enter the device and to protect groundwater quality. Avoid infiltration where this isn t possible.
	Were infiltration rates obtained by desk study or infiltration test?			Infiltration rates can be estimated from desk studies at most stages of the planning system if a back-up attenuation scheme is provided.
In light of the above, is infiltration feasible?	Yes/No? If No, please identify how the storm water will be stored prior to release.			If infiltration is not feasible how will the additional volume be stored? The applicant should then consider the following options in the next section. Soakaways should be sized to accommodate the 1:100yr storm plus an aapropriate allowance for climate change where possible.
Climate change allowance used:				

7. Calculate Attenuation Storage

(1)		Notes
Storage attenuation volume in m3 required		Volume of water to attenuate on site. Cannot be used where discharge volumes are increasing.

1. Attenuation storage is provided to enable the rate of runoff from the site into the receiving infrastructure to be limited to an acceptable rate to protect flooding downstream. The attenuation storage volume is a function of the degree of development relative to the greenfield discharge rate.

7a. Storage Requirements

Please detail/attach the calculations undertaken to determine storage volume and detail investigations undertaken with regard to the receiving infrastructure/watercourse.(1)	

1. Refer to guidance document for further information on storage requirements.

8. Additional Information

		Notes
Which drainage system has been used? i.e ponds/swales/permeable paving/rain gardens		SUDS can be adapted for most situations even where infiltration isn t feasible e.g. impermeable liners beneath some SUDS devices allows treatment but not infiltration. See CIRIA SUDS Manual C697and C753.
Drainage system able to contain water in a 1 in 30 year storm event without flooding		A requirement for sewers for adoption and good practice even where drainage system is not adopted. http://sfa.wrcplc.co.uk/
Any flooding between 1 in 30 and 1 in 100 plus climate change storm events will be safely contained on site.		**Safely**: not causing property flooding or posing a hazard to site users i.e. no deeper than 300mm on roads/footpaths. Flood waters must drain away at section 6 rates. Existing rates can be used where runoff volumes are not increased.
How are rates being restricted? (flow control)		Flow control devices can be used where rates are between 2l/s to 5l/s. Orifices should not be used below 5l/s as the pipes may block. Pipes with flows < 2l/s are prone to blockage.

Drainage during construction period		Provide details of how drainage will be managed during the construction period including any necessary connections, impacts, diversions and erosion control.

9. Management and Maintenance

		Notes
How is the entire drainage system to be maintained in perpetuity?(1)		Clear details of the maintenance proposals of all elements of the proposed drainage system must be provided to show that all parts of SuDs are effective and robust. Provide a management plan to describe the SUDS scheme and set out the management objectives for the site. It should consider how the SuDs will perform and develop over time anticipating any additional maintenance tasks to ensure the system continues to perform as designed. — Specification notes that describe how work is to be undertaken and the materials to be used. — A maintenance schedule describes what work is to be done and when it is to be done using frequency and performance requirements as appropriate. — A site plan showing maintenance areas, control points and outfalls. Responsibility for the management and maintenance of each element of the SUDS scheme will also need to be detailed within the Management Plan. Where open water is involved please provide a health and safety plan within the management plan.
Please confirm the owners/adopters of the entire drainage system throughout the development. Please list all owners.		If these are multiple owners then a drawing illustrating exactly what features will be within each owner s remit must be submitted with this pro forma. Please give details

		of each feature and how it will be managed in accordance with the details in the management plan.
Please provide details demonstrating that any third party agreements required using land outside the application site have been secured.		i.e. Legal agreements, s106, Environment Agency Flood Defence Consent / Lead Local Flood Authority s.23 Land Drainage Act Consent

1. Details are required to be provided of the management and maintenance plan for the system, including for the individual plots in perpetuity. If open water is involved, a health and safety plan will also be required.

Submission Checklist

See Section 7.81 for the minimum level of information required to be submitted to the LLFA, for minor and major applications.

Appendix 4: List of References

The following documents and pieces of legislation have been mentioned within this SPD and are linked below for convenience.

CIRIA C753 - SuDS Manual (2015)

West Yorkshire Combined Authority SuDS Guidance

Flood and Water Management Act 2010

National Planning Policy Framework 2021

Planning Practice Guidance - Flood Risk

Water Framework Directive 2000/60/EC

Floods Directive 2007/60/EC

Check the long term flood risk for an area in England - GOV.UK

Flood Map for Planning - GOV.UK

Areas Susceptible to Groundwater Flooding - British Geological Society

Calder Catchment Strategic Flood Risk Assessment (SFRA), 2016

Flood Risks to People - DEFRA/Environment Agency, 2006

Town and Country Planning Act, 1990

CIRIA C688 - Flood Resilience and Resistance for Critical Infrastructure (2010)

Improving the Flood Performance of New Buildings: Flood Resilient Construction - CLG (2007)

Flood Resilient Building (DG 523) - BRE (2012)

Soakaway Design (DG 365) - BRE (2016)

Climate Change Allowance Guidance for FRA's

Appendix 5: Glossary

Abbreviations

Abbreviation	Definition
ACDP	Area with Critical Drainage Problems
CDA	Critical Drainage Area
CFMP	Catchment Flood Management Plan
CIRIA	Construction Industry Research and Information Association
CMBC	Calderdale Metropolitan Borough Council
CRT	Canal and River Trust
CSO	Combined Sewer Overflow
DEFRA	Department for Environment, Food and Rural Affairs
DS	Drainage Strategy
EA	Environment Agency
EU	European Union
FRA	Flood Risk Assessment
FWMA	Flood and Water Management Act 2010
LFRMS	Local Flood Risk Management Strategy
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
LRF	Local Resilience Forum
NFM	Natural Flood Management
NPPF	National Planning Policy Framework
PFRA	Preliminary Flood Risk Assessment
PPG	Planning Practice Guidance
RBMP	River Basin Management Plans
RMA	Risk Management Authorities
SAB	SUDS Adoption Body
SFRA	Strategic Flood Risk Assessment
SPD	Supplementary Planning Document
SuDS	Sustainable Drainage Systems
SWMP	Surface Water Management Plan
YW	Yorkshire Water Services

Glossary

Table 5.1

Term	Definition
Attenuation	The storage of water to reduce peak discharge of water
Catchment Flood Management Plan	A high-level plan through which the Environment Agency works with their key decision makers within a river catchment to identify and agree policies to secure the long-term sustainable management of flood risk.
Climate change	Long term variations in global temperature and weather patterns caused by natural and human actions. Allowances for fluvial and rainfall events are set on a catchment basis and change depending on the vulnerability of the development and its risk of flooding. For Flood Risk Assessments, all current Climate Change Allowances (Peak River Flow, Peak Rainfall Intensity and Sea level/tidal) can be obtained from https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances
Critical Drainage Area	A Critical Drainage Area is considered to be an area contributing surface water runoff, either as direct overland flow or from the existing sewer network, which causes flooding at locations within that area.
Culvert	A structure, often a channel or pipe, that carries water below the level of the ground.
Calderdale Flood Action Plan	Written by the Environment Agency and sets out a programme of work that will help Calderdale recover from the floods and to improve resilience and reduce the risk of flooding. It focuses on four key areas: Strengthening defences – projects and schemes to reduce flooding from rivers and surface water; Natural flood management – managing the landscape to slow down the flow of water; Resilient infrastructure – strengthening our infrastructure - such as sewer systems, electricity substations and transport routes; Community resilience – working with the community to help them to prepare for and recover from flooding
Exception Test	The approach set out in the NPPF to help ensure that where new development is proposed in areas of flood risk, risk to people and property will be managed satisfactorily, while allowing necessary development to go ahead in situations where suitable sites at lower risk of flooding are not available. For the Exception Test to be satisfied it must be demonstrated that the development will be safe for its lifetime, will not increase flood risk overall and will deliver wider sustainability benefits that outweigh the risk of flooding.
Flood defence	Infrastructure used to protect an area against floods, such as floodwalls and embankments; they are designed to a specific standard of protection (design flood) which is the largest flood that a given project is designed to safely accommodate.
Flood resilience	Measures that minimise water damage (e.g. to buildings) and promote fast drying and easy cleaning.
Flood resistant	Measures that prevent flood water entering a building or damaging its fabric. This has the same meaning as flood proof.
Flood risk	The level of flood risk is the product of the frequency or likelihood of the flood events and their consequences (such as loss, damage, harm, distress and disruption).

Appendix 5: Glossary

Term	Definition
Flood Zone	Flood Zones refer to the probability of river and sea flooding ignoring the presence of existing flood defences (i.e. the natural floodplain). It should be noted that Flood Zones on the Environment Agency Flood Map for Planning do not take account of the potential impact of climate change.
Fluvial	Relating to the actions, processes and behaviour of a watercourse (river or stream).
Freeboard	A freeboard is used to account for residual uncertainty within design, often an extra 300mm or 600mm added to finished floor level above the design flood level to account for any uncertainty in flood levels as a safety factor.
Functional floodplain	Land where water has to flow or be stored in times of flood
Groundwater	All water which is below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil
Lead Local Flood Authority (LLFA)	As defined by the Flood and Water Management Act, Calderdale Council (SCC) as LLFA is responsible for developing, maintaining and applying a strategy for local flood risk management (flooding from surface water, groundwater and ordinary watercourses) in their areas and for maintaining a register of flood risk assets.
Local Planning Authority (LPA)	The public authority that is responsible for controlling planning and development through the planning system.
Major development	The Town and Country Planning (Development Management Procedure) (England) Order 2015 defines major development as 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 dwellinghouses where— (i) the number of dwellinghouses 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 Further detail is provided in Appendix 1 to this SPD regarding the specific interpretation of 'Major' and 'Minor' development in relation to surface water drainage.
Main river	Watercourse defined on a ‘Main River Map designated by Defra. The Environment Agency has permissive powers to carry out flood defence works, maintenance and operational activities for Main Rivers only.
Mitigation measure	An element of development design which may be used to manage flood risk or avoid an increase in flood risk elsewhere
Ordnance Datum	In the British Isles, an ordnance datum is a vertical datum used by an ordnance survey as the basis for deriving altitudes on maps. A spot height

Term	Definition
	may be expressed as AOD (Above Ordnance Datum), in this instance meaning above mean sea level at Newlyn in Cornwall.
Ordinary watercourse	A watercourse that does not form part of a main river. This includes “all rivers and streams and all ditches, drains, cuts, culverts, dikes, sluices (other than public sewers within the meaning of the Water Industry Act 1991) and passages, through which water flows” according to the Land Drainage Act 1991.
Residual flood risk	The remaining flood risk after risk reduction measures have been taken into account. An example of residual flood risk includes the failure of flood management infrastructure, or a severe flood event that exceeds a flood management design standard, such as a flood that overtops a raised flood defences, or an intense rainfall event which the drainage system cannot cope with.
Return period	Also known as a recurrence interval, it is an estimate of the likelihood of an event such as a flood to occur
Risk	Risk is a factor of the probability or likelihood of an event occurring multiplied by consequence: Risk = Probability x Consequence. It is also referred to in this SPD in a more general sense.
Sequential test	Aims to steer vulnerable development to areas of lowest flood risk.
Sewer flooding	Flooding caused by a blockage or overflowing from a sewer
Source Protection Zone (SPZ)	Defined areas in which certain types of development are restricted to ensure that groundwater sources remain free from contaminants
Surface water flooding	Flooding caused when intense rainfall exceeds the capacity of the drainage systems or when, during prolonged periods of wet weather, the soil is so saturated such that it cannot accept any more water.
Sustainable drainage systems (SuDS)	Methods of management practices and control structures that are designed to drain surface water in a more sustainable manner than some conventional techniques
Topographical survey	A survey of ground levels.