

# **North West Yorkshire Level 1 SFRA Update**

**Final Report**

**Volume 1 - User Guide**

**April 2010**

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## Revision History

Revision Ref / Date Issued	Amendments	Issued to
Initial Draft: 8th October 2009	Initial DRAFT report	Linda Marfitt 1 copy of report by email (4 copies of report, maps and Sequential Testing Spreadsheet on CD)
FINAL 15th April 2010	<ul style="list-style-type: none"> <li>- Responses to feedback on DRAFT report from Linda Marfitt and Roy Firth (HBC), John Hiles (RDC), Sam Kipling and Dan Normandale (EA)</li> <li>- Update to flood zones in Ripon and Pateley Bridge.</li> </ul>	Linda Marfitt (HBC), Sian Watson (CDC), John Hiles (RDC) and Dan Normandale (EA)

## Contract

This report describes work commissioned by Harrogate Borough Council, on behalf of Harrogate Borough Council, Craven District Council and Richmondshire District Council by a letter dated 01/04/2009. Harrogate Borough Council's representative for the contract was Linda Marfitt. Judith Stunell and Mike Williamson of JBA Consulting carried out this work.

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## Acknowledgments

JBA would like to thank those who provided information and data for this report. From Harrogate Borough Council: Linda Marfitt, Mike Wood, Roy Firth and Mike Wickens. From Craven District Council: Laura Kennedy and Graham Tarn. From Richmondshire District Council: John Hiles. From the Environment Agency: Dan Normandale, Jonathan Boyes and Sam Kipling. From North Yorkshire Fire and Rescue Service Fire Service: Carol Haughton. Yorkshire Water: Stephanie Walden

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# Executive Summary

## Introduction

Harrogate Borough Council, Richmondshire District Council and Craven District Council are required to undertake a Strategic Flood Risk Assessment (SFRA) as an essential part of the pre-production/evidence gathering stage of the Local Development Framework (LDF) and in preparing their Local Development Documents (LDDs). The SFRA (known as the North West Yorkshire SFRA) provides baseline information for use in the preparation of the Sustainability Appraisal (SA) of LDDs for the scoping and evaluation stages.

The requirement for and guidance on the preparation of SFRAs is outlined in Planning Policy Statement 25 Development and Flood Risk (PPS25) and its Practice Guide. This requires Local Planning Authorities (LPAs) to take a more dominant role in local flood risk management and to demonstrate that due regard has been given to the issue of flood risk at all levels of the planning process to avoid inappropriate development.

Local authority planners must demonstrate that a risk based, sequential approach has been applied in preparing development plans and that flood risk has been considered during the planning application process. This must be achieved through the application of the Sequential and Exception Test as outlined in PPS25.

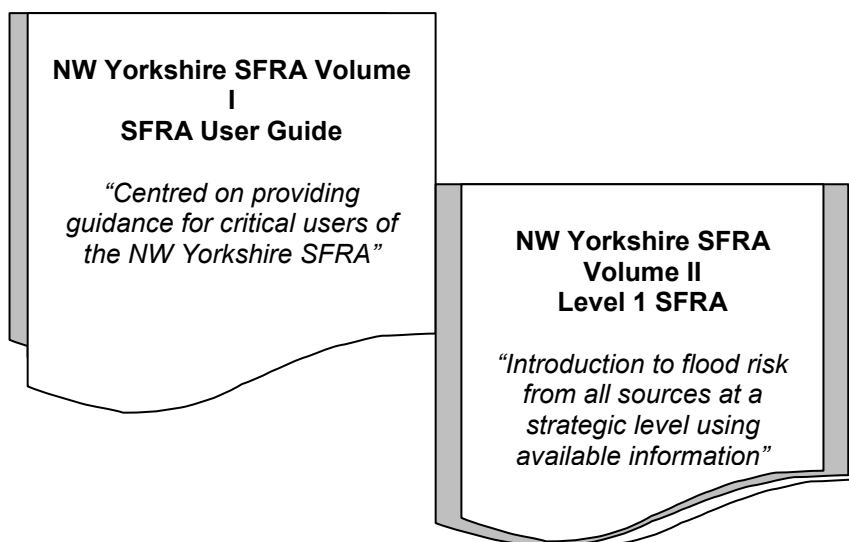
By providing a central store for data, guidance and recommendations of flood risk issues at a local level, the SFRA is an important planning tool that enables the LPA to carry out the Sequential and Exception Test and to select and develop sustainable site allocations with regard to flood risk.

The SFRA will also enable Local Authorities to take a sequential approach to flood risk in their Core Strategies and other Local Development Documents (LDDs) such as area action plans. This can influence the steering of development both within and between settlements.

SFRAs can also provide a much broader and inclusive vehicle for integrated, strategic and local Flood Risk Management (FRM) assessment and delivery, by providing the linkage between Catchment Flood Management Plans (CFMPs), Regional Flood Risk Appraisals (RFRAs) and Surface Water Management Plans (SWMPs). The suite of flood risk policy issues and information on the scale and nature of the risks in these various documents needs to be brought into “real” settings with the SFRA tasked with improving the understanding of flood risk across the districts.

## SFRA User Guide

The North West Yorkshire Level 1 Strategic Flood Risk Assessment (SFRA) is presented across two separate report Volumes and are referred to as the „NW Yorkshire SFRA Volumes I and II“ throughout this User Guide:



The NW Yorkshire SFRA Volume I (User Guide) has been developed to provide specific guidance for SFRA users and should be the first point of call when using the NW Yorkshire SFRA. Each User specific section links the evidence provided in the NW Yorkshire SFRA Volume II and their associated mapping.

The user guide provides:

- A brief **introduction to the SFRA process** and the development of the SFRA (Section 1)
- An overview of the **Sequential and Exception Tests** (Section 2)
- Tailored **guidance** for Spatial Planners (Section 3), Development Control (Section 4), Developers (Section 5) and Emergency Planners (Section 6). This is summarised in tables below.

The user guide also contains a number of appendices which provide more detail on certain parts of the SFRA process:

- **Flood Risk** - Appendix A describes the flood risk concepts which underpin the SFRA. Appendix B outlines the hierarchy of flood risk and Appendix C summarises flood risk mitigation and management. Appendix H summarises Sustainable Drainage Systems (SuDS). These give an overview for SFRA users who are not flood risk management specialists.
- **Planning Framework** - Appendix D describes the Planning context for the SFRA including Flood Risk Management and Planning Policy Drivers. This appendix gives an overview of the emerging LDFs for Harrogate Borough Council, Richmondshire District Council and Craven District Council.
- **Stakeholder Engagement** - Appendix E summarises the stakeholders we have consulted during development of the SFRA.
- **Flood Risk Zones** - Appendix F summarises the Flood Risk Zones, their appropriate uses, FRA requirements and the aim of PPS 25 in each zone.
- **Flood Vulnerability Classification** - Appendix G lists vulnerability of types of development based on PPS 25. This is used when applying the Exception Test.

## Where is the Guidance?

### Spatial Planners

Where is the guidance?		<ul style="list-style-type: none"> <li>PPS 25 and its User Guide</li> <li>Sequential and Exception Test - section 2, North West Yorkshire SFRA, Volume 1</li> <li>Applying the Sequential and Exception Test in practice - section 3, SFRA Volume 1</li> </ul>		
Task	How	Guidance	Primary Maps	Secondary Maps
Allocating Development in LDDs	<ul style="list-style-type: none"> <li>Sequential Test</li> <li>Vulnerability Classification</li> <li>Exception Test</li> </ul>	<ul style="list-style-type: none"> <li>PPS25 Table D.1, D.2 &amp; D.3</li> <li>SFRA Volume I Section 2 and Section 3</li> </ul>	<ul style="list-style-type: none"> <li>Flood Zones</li> <li>Climate change</li> <li>Surface water</li> </ul>	<ul style="list-style-type: none"> <li>Depth &amp; Hazard</li> </ul>
Draft LDD Flood Risk Policies	<ul style="list-style-type: none"> <li>Using the Guidance &amp; Recommendations in the NW Yorkshire SFRA</li> </ul>	<ul style="list-style-type: none"> <li>SFRA Volume I Section 3.1.1</li> </ul>	<ul style="list-style-type: none"> <li>Flood Zone</li> <li>Surface water</li> <li>CDAs</li> <li>FRM</li> </ul>	<ul style="list-style-type: none"> <li>Depth &amp; Hazard</li> </ul>

### Development Control

Where is the Guidance?		<ul style="list-style-type: none"> <li>PPS25 and Its User Guide</li> <li>Sequential and Exception Test - section 2, North West Yorkshire SFRA, Volume 1</li> <li>Assessing Development Applications - section 4, North West Yorkshire SFRA volume 1</li> </ul>		
Task	How	Guidance	Primary Maps	Secondary Maps
Consult on proposed development	Pre-application discussion with developer	<ul style="list-style-type: none"> <li>PPS25 PG p21</li> </ul>	<ul style="list-style-type: none"> <li>Flood Zone</li> <li>Surface water</li> </ul>	-
Assess site regarding Sequential & Exception Test	Refer developer to LDD & SFRA.  Has the site been tested?	<ul style="list-style-type: none"> <li>SFRA Volume I Section 2</li> <li>Section 4.2 and 4.3</li> </ul>	<ul style="list-style-type: none"> <li>Flood Zone</li> <li>Climate change</li> <li>Surface water</li> <li>CDAs</li> </ul>	<ul style="list-style-type: none"> <li>Depth &amp; Hazard</li> </ul>
Scope appropriate FRA	Consult EA & other stakeholders	<ul style="list-style-type: none"> <li>PPS25 PG p55</li> <li>SFRA Volume I Section 4.3.4, 5.3 and 5.4</li> </ul>	<ul style="list-style-type: none"> <li>Flood Zone</li> <li>Climate change</li> <li>Surface water (and refined)</li> <li>CDAs</li> </ul>	<ul style="list-style-type: none"> <li>Depth &amp; Hazard</li> </ul>
Assess FRA	Does the FRA meet all requirements?	<ul style="list-style-type: none"> <li>PPS25 PG S5 6 7</li> <li>SFRA Volume I Section 5.4</li> </ul>	-	-

## Individual Developers

Where is the Guidance?		PPS25 and Its User Guide Sequential and Exception Test - section 2, North West Yorkshire SFRA, Volume 1 Flood Risk Assessment - section 5, North West Yorkshire SFRA volume 1		
Task	How	Guidance	Primary Maps	Secondary Maps
Consult on proposed development	Pre-application discussion with development control.	<ul style="list-style-type: none"> <li>PPS25 PG p21</li> </ul>	<ul style="list-style-type: none"> <li>Flood Zones</li> <li>Surface water (and refined)</li> <li>CDAs</li> </ul>	-
Assess site regarding Sequential & Exception Test	Refer to LDD & SFRA. Has the site been tested?	<ul style="list-style-type: none"> <li>SFRA Volume I Section 4.3</li> <li>SFRA Sites Spreadsheet</li> <li>SFRA Volume 2 - site tables</li> </ul>	<ul style="list-style-type: none"> <li>Flood Zones</li> <li>Climate change</li> <li>Surface water (and refined)</li> <li>CDAs</li> </ul>	<ul style="list-style-type: none"> <li>Depth &amp; Hazard</li> </ul>
Carry out appropriate assessment of flood risk	Consult EA & other stakeholders	<ul style="list-style-type: none"> <li>PPS25 PG p55</li> <li>SFRA Volume I Section 5.4</li> </ul>	<ul style="list-style-type: none"> <li>Flood Zones</li> <li>Climate change</li> <li>Surface water (and refined)</li> <li>CDAs</li> </ul>	<ul style="list-style-type: none"> <li>Depth &amp; Hazard</li> </ul>
Provide assessment of possible mitigation measures and emergency planning needs	Using the Guidance & Recommendations within the NW Yorkshire SFRA	<ul style="list-style-type: none"> <li>PPS25 PG S5 6 7</li> <li>SFRA Volume I Appendix C</li> </ul>	<ul style="list-style-type: none"> <li>FRM</li> <li>Depth &amp; Hazard</li> <li>CDAs</li> </ul>	<ul style="list-style-type: none"> <li>Climate Change</li> <li>Refined surface water</li> </ul>

## Emergency Planners

Where is the Guidance?		<ul style="list-style-type: none"> <li>PPS25 and Its User Guide</li> <li>Sequential and Exception Test - section 2, North West Yorkshire SFRA, Volume 1</li> <li>Flood Risk Assessment - section 6, North West Yorkshire SFRA volume 1</li> </ul>		
Task	How	Guidance	Primary Maps	Secondary Maps
Update Multi-agency flood plans	Using the Maps and Guidance in the NW Yorkshire SFRA	<ul style="list-style-type: none"> <li>SFRA Volume I Section 6 and Appendix C</li> <li>PPS25 PG S7</li> </ul>	<ul style="list-style-type: none"> <li>Flood Zones</li> <li>FRM</li> <li>Climate change</li> <li>Surface water</li> </ul>	<ul style="list-style-type: none"> <li>Depth &amp; Hazard</li> <li>Refined surface water</li> </ul>
Provide input to developer flood plans	Using the Maps and Guidance in the NW Yorkshire SFRA	<ul style="list-style-type: none"> <li>SFRA Volume I Section 6 and Appendix C</li> <li>PPS25 PG S7</li> </ul>	<ul style="list-style-type: none"> <li>Flood Zones</li> <li>FRM</li> <li>Climate change</li> <li>Surface water</li> </ul>	<ul style="list-style-type: none"> <li>Depth &amp; Hazard</li> <li>Refined surface water</li> </ul>
Raise awareness	Using the Maps and Guidance in the NW Yorkshire SFRA	<ul style="list-style-type: none"> <li>SFRA Volume I Section 6 and Appendix C</li> </ul>	<ul style="list-style-type: none"> <li>Flood Zones</li> <li>FRM</li> <li>Climate change</li> <li>Surface water</li> </ul>	<ul style="list-style-type: none"> <li>Depth &amp; Hazard</li> <li>Refined surface water</li> </ul>

## NW Yorkshire SFRA Mapping

The NW Yorkshire SFRA Volume II has produced a suite of strategic flood risk maps. These maps should be used to guide development away from high flood risk areas in conjunction with the guidance in PPS25 and its Practice Guide and the guidance provided in the NW Yorkshire SFRA Volume I (this document).

Below is a complete list of all maps produced in the NW Yorkshire SFRA Volume II.

Map Name	Map Reference	SFRA Reference
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<b>Flood Zones</b>	Maps A (H1-26, C1-10, R1-13)	Volume II Sections 3.1, 3.2, 4.3 & 5.2
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**Description** - These maps show Flood Zone 3b, possible extensions to 3b, 3a, 2, 1 and proposed development allocations.

**Use** - This map should be used to facilitate the application of the Sequential Test by Spatial Planners and Development Control officers. See Sections 3, 4 and 5 for more guidance.

<b>Fluvial depth</b>	Maps B (H1-46, C1-6, R1-23)	Volume II Section 5.3
<b>Fluvial hazards</b>	Maps C (H1-46, C1-6, R1-23)	Volume II Section 5.3

**Description**- The depth maps were obtained from the Environment Agency North East Broad Scale modelling work for CFMPs undertaken by JBA Consulting in 2008. They identify both depths and hazards during the 1 in 100 year fluvial flood events. Further detailed mapping of fluvial depth and hazard is recommended in some locations in a Level 2 SFRA.

The hazard maps have been produced as a function of flood depth, flood velocity and a debris factor used in the Environment Agency's Phase 2 of the Risks to People Project. Flood hazards are categorised as No hazard, Very low hazard, Dangerous for some, Dangerous for most and Dangerous for all.

**Use** - These maps should be used during the Sequential Test and provide the evidence to inform the likelihood of sites passing the Exception Test. Sites situated in communities with high depths and/or hazards should be avoided and would find it difficult to pass the Exception Test. Emergency planners may also find this useful in designating access and egress routes.

<b>Climate Change Sensitivity</b>	Maps D (H1-9, C1-4, R1-3)	Volume II Sections 4.11 & 5.4
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**Description** - These maps have been produced using information from available models of parts of the SFRA area. Elsewhere Flood Zone 2 is assumed to provide a maximum extent for the impact of climate change.

**Use** - They should be used as an early indication of areas in which fluvial flooding may increase over the next 50 years. These maps are useful when carrying out a sweep of sites that may require the Exception Test by Spatial Planners, Development Control and developers in assessing possible future fluvial risks. Emergency planners may also find them useful while designating access and egress routes.



<b>Flood Risk Management</b>	Maps E (H1-19, C1-6, R1-7)	Volume II Sections 3.3, 4.12, 4.13 & 5.5
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**Description** - These maps provide the location of current Flood Risk Management (FRM) Measures within the study area including defences, Areas Benefiting from Defences (1 in 100 year standard of protection) and, Environment Agency Flood Warning Areas.

**Use** - These maps can be used to identify communities currently protected.

<b>Surface Water Flooding</b>	Maps F (H-9, C1-9)	Volume II Sections 4.4 and 5.6
-------------------------------	--------------------	--------------------------------

**Description** - These maps (Set F) have been produced using detailed surface water mapping for locations in Harrogate BC and Craven DC Areas.

**Use** - This map has been used (in association with the Environment Agency Areas Susceptible to Surface Water Flooding Maps) within the NW Yorkshire SFRA Volume II to identify possible Critical Drainage Areas. This map should be used during the Sequential Test and during scoping of individual FRAs.

<b>Historical Flooding</b>	Maps G (H1-4, C1-2, R1-3)	Volume II Sections 3.6, 4.2 & 5.7
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**Description** - These maps show any historical flooding that has occurred in the council areas. Historical flooding is presented in the form of Flood Event Outlines (FEOs), flood incident call outs from the North Yorkshire Fire and Rescue and Craven District Council information about flood hotspots.

**Use** - These maps indicate areas where there flooding has been recorded in the past.

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## Abbreviations

AAP	Area Action Plan
ABD	Areas Benefiting from Defences
AEP	Annual Exceedance Probability
CDA	Critical Drainage Area
CFMP	Catchment Flood Management Plans
CLG	Communities and Local Government
COW	Critical Ordinary Watercourse
CRR	Community Risk Register
CS	Core Strategy
DPDs	Development Plan Documents
EA	Environment Agency
EU	European Union
FAS	Flood Alleviation Schemes
FEH	Flood Estimation Handbook
FCERM	Flood and Coastal Erosion Risk Management
FRA	Flood Risk Assessment
FRM	Flood Risk Management
GI	Green Infrastructure
IDB	Internal Drainage Board
IDD	Internal Drainage District
IFM	Indicative Floodplain Map
LCR	Leeds City Region
LDDs	Local Development Documents
LDF	Local Development Framework
LPAs	Local Planning Authorities
LRF	Local Resilience Forum
NEA	North East Assembly
NFCDD	National Fluvial and Coastal Defence Database
NLRF	Northumbria Local Resilience Forum
NPD	National Property Dataset
NYCC	North Yorkshire County Council
NYLRF	North Yorkshire Local Resilience
NYFRS	North Yorkshire Fire and Rescue Service
PFRA	Preliminary Flood Risk Assessment
PPG	Planning Policy Guidance
PPS	Planning Policy Statement
RBD	River Basin District
RBMP	River Basin Management Plan
RFRA	Regional Flood Risk Assessment
RPB	Regional Planning Bodies
RPG	Regional Planning Guidance
RRF	Regional Resilience Forum
RSS	Regional Spatial Strategy
RVFD	Receptors Vulnerable to Flooding Database
SA	Sustainability Appraisal
SCI	Statement of Community Involvement
SEA	Strategic Environmental Assessment
SFRA	Strategic Flood Risk Assessment
SFVI	Social Flood Vulnerability Index
SHMA	Strategic Housing Market Assessment
SMP	Shoreline Management Plans



SoP	Standard of Protection
SPD	Supplementary Planning Document
SuDS	Sustainable Drainage Systems
SWMP	Surface Water Management Plan
UDP	Unitary Development Plan
WCS	Water Cycle Study
WFD	Water Framework Directive
YW	Yorkshire Water

# 1. Introduction

## 1.1 Background

JBA Consulting was commissioned in June 2009 by Harrogate Borough Council to undertake a review of the existing North West Yorkshire Strategic Flood Risk Assessment (SFRA) published in 2006.

The Level 1 SFRA has been prepared in accordance with current best practice, Planning Policy Statement 25 Development and Flood Risk (PPS25)<sup>1</sup> and the PPS25 Practice Guide<sup>2</sup>.

### 1.1.1 Flood risk assessment

Flooding is a natural process and does not respect political demarcations or administrative boundaries; it is influenced principally by natural elements of rainfall, tides, geology, topography, rivers and streams and man made interventions such as flood defences, roads, buildings, sewers and other infrastructure. As was seen in the summer 2007 floods, flooding can cause massive disruption to communities, damage to property and possessions and even loss of life. These flood risk concepts are described in Appendix A, B and C. The risk of flooding from rivers, surface water, sewers, groundwater, canals and reservoirs has been explored for Harrogate, Craven and Richmondshire Council areas as part of this SFRA.

It is important to avoid developing in flood risk areas in the first instance. Where this is not possible development should be directed to areas with the lowest possible level of flood risk. Having exhausted all opportunities to direct development away from areas of flood risk then the allocation of land for development must consider the vulnerability of the proposed land use to flooding and take measures to minimise flood risk to people, property and the environment. This is the thrust of the risk based sequential approach to managing flood risk and it is the backbone of PPS25.

Current Government policy requires local authorities to demonstrate that due regard has been given to the issue of flood risk as part of the planning process. It also requires that flood risk is managed in an effective and sustainable manner. Where new development is (as an exception) necessary in flood risk areas, the policy aim is to make it safe without increasing flood risk elsewhere and wherever possible reducing overall flood risk.

The SFRA fits into a hierarchy of Flood Risk Assessments, each at an increasing level of detail. These are designed to inform different stages of the planning system, from Regional Spatial Strategies to site specific Planning Applications. More background on this is provided in Appendix D.

<sup>1</sup> Communities and Local Government (2006 - revised 2010) *Planning Policy Statement 25: Development and Flood Risk*

<sup>2</sup> Communities and Local Government (Dec 2009) *Planning Policy Statement 25: Development and Flood Risk – Practice Guide*

## 1.1.2 The Planning Framework

The land use planning process is driven by a whole host of policy guidance on a national, regional and local level. Whilst the majority of these policies are not aimed at mitigating flood risk, there are key links at strategic, tactical and operational levels between land use and spatial planning (Regional and Local Government), and Flood Risk Management (FRM) planning (Environment Agency), which should be considered as part of a planned and integrated approach to delivering sustainable development. Table 1-1 lists relevant legislation, plans, policies and strategies. More detail on these is provided in Appendix D.

Table 1-1 Relevant Legislation, Plans, Policies and Strategies	
National Level	
<ul style="list-style-type: none"> <li>• EU Floods Directive – EU (2007)</li> <li>• Draft Flood and Water Management Bill – Defra (2009)</li> <li>• Future Water – Defra (2008)</li> <li>• Improving Surface Water Drainage – Defra (2008)</li> <li>• Making Space for Water – Defra (2005)</li> <li>• Learning Lessons from the 2007 Floods – Sir Michael Pitt (2008)</li> </ul>	<ul style="list-style-type: none"> <li>• Planning Policy 25: Development and Flood Risk – DCLG (2006)</li> <li>• Planning Policy 25: Development and Flood Risk Practice Guide – DCLG (2008)</li> <li>• PPS1 Delivering Sustainable Development – ODPM (2005)</li> <li>• Planning Policy Statement: Planning and Climate Change, supplement to PPS1 – DCLG (2007)</li> </ul>
Regional Level	
<ul style="list-style-type: none"> <li>• River Lune Catchment Flood Management Plan – Environment Agency (2008)</li> <li>• River Ribble Catchment Flood Management Plan - Environment Agency (2008)</li> <li>• River Tees CFMP (2009)</li> <li>• Aire CFMP - consultation on Draft report in early 2010</li> <li>• River Ouse CFMP - consultation on Draft report in 2010.</li> <li>• Humber Regional Flood Risk Appraisal – Yorkshire and Humber Regional Assembly (Scoping Study Draft Report, June 2008)</li> </ul>	<ul style="list-style-type: none"> <li>• The Yorkshire and Humber Plan, Regional Spatial Strategy to 2026 – Government Office for Yorkshire and Humber (2008)</li> <li>• Humber River Basin Management Plan - Environment Agency (2009)</li> <li>• North West River Basin Management Plan – Environment Agency (2008)</li> </ul>
Local Level	
<ul style="list-style-type: none"> <li>• Flood risk assessments for development sites</li> </ul>	<ul style="list-style-type: none"> <li>• Emerging Local Development Frameworks for Harrogate, Craven and Richmondshire</li> <li>• Existing UDPs for Harrogate, Craven and Richmondshire</li> </ul>

## 1.2 Development of the SFRA

The SFRA has been lead by Harrogate Borough Council. Officers from Harrogate BC, Craven DC and Richmondshire DC and the Environment Agency have played a key role in directing the SFRA. North Yorkshire County Council, Yorkshire and Humberside Fire and Rescue Authority, Internal Drainage Boards and Yorkshire Water were consulted during the development of the SFRA. More information on stakeholder engagement and data management is provided in Appendix E.

The North West Yorkshire Level 1 Strategic Flood Risk Assessment (SFRA) is provided in two volumes:

- Volume I – SFRA User Guide
- Volume II – Level 1 SFRA

### 1.2.1 Volume I North West Yorkshire SFRA User Guide

This volume has been developed to provide guidance on the use of the SFRA for Local Authority Spatial Planning, Development Control and Emergency Planning officers plus Developers.

### 1.2.2 Volume II North West Yorkshire Level 1 SFRA

The North West Yorkshire SFRA Volume II has used existing data to make an assessment of flood risk from all sources now and in the future. It provides the evidence for LPA officers to apply the Sequential Test and identify where the Exception Test is likely to be required. Both of these tests are a fundamental part of PPS25.

This study covers the local planning authority areas of Craven District Council, Harrogate Borough Council and Richmondshire District Council. Yorkshire Dales National Park area is not part of this assessment as they are currently progressing their Housing DPD and do not currently have any allocated sites. Actions taken in the national park have the potential to influence flood risk downstream and we have considered these where appropriate, any development in the National Park is likely to be small scale<sup>3</sup> (the Yorkshire Dales National Park (YDNP) is discussed in Volume II, section 1.4).

The SFRA area is characterised by a number of urban centres including Skipton, Harrogate, Knaresborough, Ripon, Richmond and a number of villages. The SFRA concentrates on future development within the districts, which will generally occur around these existing urban areas.

Key actions for the level I SFRA are:

- Stakeholder consultation, data collection and review
- Assessment of current flood risk
- Delineation of PPS25 Flood Zones including the Functional Floodplain and the impact of climate change
- Assessing flood risk from „other“ sources including surface water, groundwater, sewers, reservoirs and canals
- Considering the impact of climate change
- Assessing potential development sites
- Producing a range of strategic flood risk maps
- SFRA recommendations

<sup>3</sup> Peter Stockton , Yorkshire Dales National Park Planning Officer (11/08/2009)  
2009s0266 Vol 1 User Guide 3\_FINAL.docx



### 1.3 SFRA Monitoring and Review

The North West Yorkshire SFRA has been produced using the most up-to-date national guidance and flood risk data. This is updated from time to time and it is recommended that the SFRA should also be updated on a regular basis. The Environment Agency has suggested that this be every 3 to 4 years, unless there is a significant flood affecting the area, leading to new information on areas at flood risk becoming available. A review of the SFRA should also be undertaken if there are any major national policy changes.

There are a number of outputs and datasets which are known to be regularly updated. These should be incorporated in any update to the SFRA. Table 1-2 contains a list of SFRA review triggers.

Table 1-2 SFRA Review Triggers		
Trigger	Sources	Possible Timescale
CFMP	Environment Agency	Updated every 5 years
Flood Zones	Environment Agency	Updated quarterly
NFCDD	Environment Agency	Ongoing
Possible Flood Event	All	Unknown
Sewer Flood Data	Yorkshire Water	Unknown
Multi-Agency Flood Plans	North Yorkshire County Council	Ongoing
Planning Policy	CLG	Unknown
Surface Water Management Plans	LPA	Unknown

## 2. PPS25: The Sequential and Exception Tests

### 2.1 Introduction

Flooding is a natural process and does not respect political demarcations or administrative boundaries; it is influenced principally by natural elements of rainfall, tides, geology, topography, rivers and streams and man made interventions such as flood defences, roads, buildings, sewers and other infrastructure. As was seen in the summer 2007 floods, flooding can cause massive disruption to communities, damage to property and possessions and even loss of life.

For this reason it is important to avoid developing in flood risk areas in the first instance. Where this is not possible development should be directed to areas with the lowest possible level of flood risk. Having exhausted all opportunities to direct development away from areas of flood risk then the allocation of land for development must consider the vulnerability of the proposed land use to flooding and take measures to minimise flood risk to people, property and the environment. This is the thrust of the risk based sequential approach to managing flood risk and it is the backbone of PPS25.

PPS25 takes a risk based approach to management decisions and actions using the following steps:

**Table 2-1: Risk Based Sequential Approach**

Step	Action	
1	Avoid Flood Risk	Locating new development outside areas at risk of flooding
2	Substitute	Change land use of a site to a less vulnerable one if there is a risk of flooding
3	Control and Mitigate Risks	Implement a range of flood risk management measures to reduce the impact and mitigate remaining residual risks. This should only be used as a last resort

This is known as the risk based sequential approach and should be considered throughout the planning process to ensure that opportunities are taken to minimise flood risk at every stage. The main aim of this approach is to ensure that risks to people, property and the environment are reduced to acceptable levels.

The risk based sequential approach is delivered using the Sequential and Exception Tests. The Environment Agency's Flood Zones are a starting point for this.

The **Sequential Test** is applied first and is a key driver for the level 1 SFRA. The Sequential Test is applied to demonstrate that "there are no reasonably available sites in areas with a lower probability of flooding that would be appropriate to the type of development or land use proposed" (PPS 25, section 16 and Annex D). At a strategic level the Sequential Test process is used to allocate development to areas with lower risk of flooding. It should also inform the development of policies within the Core Strategy and other DPDs. It should also be applied within a single site during the design stage to ensure that the more vulnerable parts of the development are located in the areas where the risk of flooding is lowest. The Sequential Test is discussed in more detail in section 2.2.

Following the Sequential Test and the Sustainability Appraisal which takes account of other wider sustainability objectives, it may not be possible for all development to be located in areas where the risk of flooding is low. In these cases the **Exception Test** may be applied. This assesses whether the development has wider sustainability benefits, is on previously developed land and that the development will be safe. This is discussed in section 2.3.


## 2.2 The Sequential Test

To apply the Sequential Test the LPA needs to know the location of proposed development sites and the vulnerability of the proposed use. The LPA also needs to know the spatial extent of flood risk in the SFRA area. The SFRA provides this information as a set of maps which are based on the Environment Agency's Flood zones (see appendix F) and information about other sources of flood risk.

### 2.2.1 Assessing Flood Risk from Rivers

The flood zones define the risk of flooding from rivers or the sea in a particular area, and are updated regularly. The following table shows how risk increases from Flood Zone 1 to Flood Zone 3b.

**Table 2-2: Flood Zones and the Sequential Test**

	Description	Source	Risk
Flood Zone 1	Low Probability: less than 1 in 1000 year fluvial flood event	Environment Agency	 INCREASE IN FLOOD RISK
Flood Zone 2	Medium Probability: between a 1 in 100 and 1 in 1000 year fluvial flood event	Environment Agency Flood Zone 2	
Flood Zone 3a	High Probability: a 1 in 100 year or greater fluvial flood event	Environment Agency Flood Zone 3	
Flood Zone 3b	Functional Floodplain: land where water has to flow or be stored in times of flood	Defined in SFRA based on Flood zone 3a and other detailed studies provided by the Environment Agency	

The SFRA has assessed the proportion of each site that is in Flood Zones 1 to 3b. It has also assessed the proportion of each site at risk of flooding. This allows the flood risk at each site to be compared. This information is required to carry out the Sequential Test and direct development to areas where flood risk is lowest.

### 2.2.2 Including Flood Risk from Other Sources

Flood risk can also vary within a Flood Zone as there may be flooding from other sources. These should be considered when taking a sequential approach to land use within a Flood Zone or a development site. Alternative sites within the same flood zone do not always have the same level of risk and may be differentiated based on other flood risks (e.g. depth or hazard, susceptibility to surface water flooding or scale of future increase in flood risk due to climate change).

These other sources are relevant when considering substitution of sites for those in lower risk Zones but where there may a high risk from another source of flooding.

The Sequential Test is purely based on the Flood Zones as defined by Table D1 of PPS25, but these zones only take account of fluvial and tidal flooding and do not take account of defences. Other sources of flooding are one of the key challenges faced by the LPA in applying the Sequential Test in accordance with PPS25 and its Practice Guide. It can be difficult to map the spatial extent of flooding from other sources and match the risk associated with different sources of flooding to the Flood Zones. For instance, Flood Zone 3 cannot be directly related to an area at high risk of surface water flooding as the probability and consequences are significantly different.

It may not be appropriate to avoid development at risk from other sources of flooding but risk should be considered when taking a sequential approach to land use or the substitution of lower development vulnerability in higher risk areas within a development site.

The LPA should clearly record decisions about how risk from other sources is considered during the sequential testing process. Developing policies, where necessary, to provide additional protection to areas at risk from both river flooding and flooding from other sources.

Harrogate BC, Craven DC and Richmondshire DC should consider whether to recommend sequential testing and a Flood Risk Assessment for sites (<1Ha) in Flood Zone 1 where which are vulnerable to other sources of flooding or the impacts of climate change.

### 2.2.3 Applying the Sequential Test

The Sequential Test may be applied by:

**Spatial Planners** as they carry out the strategic allocation of preferred sites and Sustainability Appraisal for the Local Development Framework and as they develop policies for the Core Strategy and other DPDs - see section 3 of this volume, Guidance for Spatial Planners

**Development Management** as they assess applications for development - see section 4 of this volume, Guidance for Development Management

Understanding The Sequential Test is also important for **Developers** on a particular site who may need to take a sequential approach when designing the layout of a site - see section 5 of this volume, Guidance for Developers.



## 2.3 The Exception Test





















### 2.3.1 Identifying when the Exception Test is Needed

If the Sequential Test has been applied and development cannot be allocated in areas of lower flood risk due, for example, to wider sustainable development needs and/or where other constraints are present (e.g. landscape, heritage and nature conservation) the Exception Test may be required.




The need for the Exception Test is determined by the vulnerability of the proposed development and the level of flood risk at a site. The vulnerability of a proposed development can be defined using Table D.2 of PPS25 provided in Appendix G.

The vulnerability category is compared with the level of flood risk (using Flood Zone information) to identify whether development is permitted, whether the Exception Test is required or whether development is not permitted. This is shown in Figure 2-1 which has been produced from Table D.3 of PPS25.

**Figure 2-1: Where the Exception Test Applies**

Flood Zone	Category	El	HV	MV	LV	WC
1						
2						
3a						
3b						

El = Essential Infrastructure, HV = Highly Vulnerable, MV – More Vulnerable, LV – Less Vulnerable, WC = Water Compatible

	Development would be permitted. An FRA would be required in Zones 2 and 3 to demonstrate that the development will be safe and may be required in Zone 1 sites
	The Exception Test is required
	Development should not be permitted in this zone

## 2.3.2 Applying the Exception Test

Once the need for the Exception Test has been identified, three stringent conditions must all be passed in order to pass the Test. These conditions (see paragraph D9 of PPS25) are as follows:

1. *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. If the LDD has reached the „submission“ stage (see Figure 4.1 of PPS12: Local Development Frameworks) the benefits of the development should contribute to the Core Strategy’s Sustainability Appraisal;*
2. *The development should be on developable previously-developed land or, if it is not on previously-developed land, that there are no reasonable alternative sites on developable previously-developed land; and*
3. *A site-specific Flood Risk Assessment must demonstrate that the development will be safe, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.*

The Exception Test can only be passed following completion of a site specific FRA to determine if the site and its occupiers will be safe during times of flood.

At a **Spatial Planning** stage, sites likely to require the Exception Test can be identified and only the likelihood of passing the Exception Test can be assessed. At some sites further detail and a level 2 SFRA may be required - further information about the role of the Spatial Planner is given in section 3 of this volume.

**Development Control** officers must make sure all parts of the Exception Test have been passed in granting planning permission - further information is given in Section 4 of this volume.

**Developers** must carry out a detailed Flood Risk Assessment to determine whether a site can pass the Exception Test - further guidance is given in section 5 of this volume.

### 3. Guidance for Spatial Planners

*The aim of this Section is to provide guidance on the use of the SFRA in Spatial Planning. Planners should also refer to the guidance on SFRA maps provided on page iv and background to the SFRA and flood risk concepts in Appendix A, C and D.*

*Spatial Planners should use the Guidance in this SFRA User Guide, and where necessary PPS25 and its Practice Guide to:*

- **Scope the Sustainability Appraisal of the Core Strategy**
  - Screen development options
  - Produce appropriate flood risk indicators
- **Avoid strategic sites at high risk of flooding where no other planning objectives outweigh flood risk**
  - Using Sustainability Appraisal and Sequential Test Spreadsheet
- **Carry out the Sequential Test on proposed development sites**
  - Using information provided in the North West Yorkshire Level 1 SFRA (Volume II) and Sequential Test Spreadsheet to avoid sites at high risk
- **Identify those sites where a greater understanding of flood risk is required**
  - These should include key development sites at high risk of flooding
- **Identify the likelihood of sites passing the Exception Test**
  - Using the Sustainability Appraisal to assess development sites with regards to other planning objectives and assign weight given to flood risk as an environmental constraint
  - Further information may be required for some sites in a Level 2 SFRA to assess level of risk to each site and likelihood of it remaining safe. If a site cannot pass all the criteria of the Exception Test it cannot be approved.
- **Allocate appropriate development through the Sustainability Appraisal**
  - Produce evidence that both Tests have been applied by noting the outcome and decisions made to avoid, substitute or allocate the site
- **Draft flood risk policies and develop guidance on each allocated site within the Sustainability Appraisal**
  - Guidance should include the need for site-specific FRAs to pass Part C) of the Exception Test

### 3.1 Introduction

PPS25 provides the basis for the sequential approach. PPS 25 policies require that the LPA consider flood risk, its mechanisms, spatial distribution and vulnerability of development in all stages of the development planning process. The Practice Guide also provides further advice on how flood risk should be taken into account in the Local Development Framework (LDF).

PPS 25 requires those responsible for making development decisions to follow a sequential approach (Avoid Risk - Substitute - and as a last resort control and mitigate risk). They must demonstrate that there are no suitable alternative development sites located in lower flood risk areas.

The sequential approach is achieved through the successive application of the Sequential Test and Exception Test (section 2 of this volume). The North West Yorkshire SFRA Volume II provides the evidence base for this decision making process and should form part of the baseline information for the Sustainability Appraisal of LDDs for the scoping and evaluation stages.

The SFRA provides the relevant flood risk information to allow the LPA to:

- Produce appropriate policies for the allocation of sites and development control which avoids flood risk to people and property
- Produce appropriate flood risk indicators to inform the Sustainability Appraisal
- Undertake the Sequential Test and inform the Exception Test (further Level 2 SFRA detail may be required to complete the Exception Test in some locations).
- Allocate appropriate land use through the sustainability appraisal

It is recommended that a supporting stand alone document is prepared by the LPA, clearly recording all decisions for each proposed development site (to avoid, substitute, control, mitigate) and the evidence that they used to make the decision. This should then be used as the evidence that the Sequential Test and Exception Test have been applied.

#### 3.1.1 Including Flood Risk in LDDs

Figure 3-1 illustrates the process of taking account of flood risk within LDDs and the use of SFRAs. This divides the process into four stages which are colour coded.

These stages are:

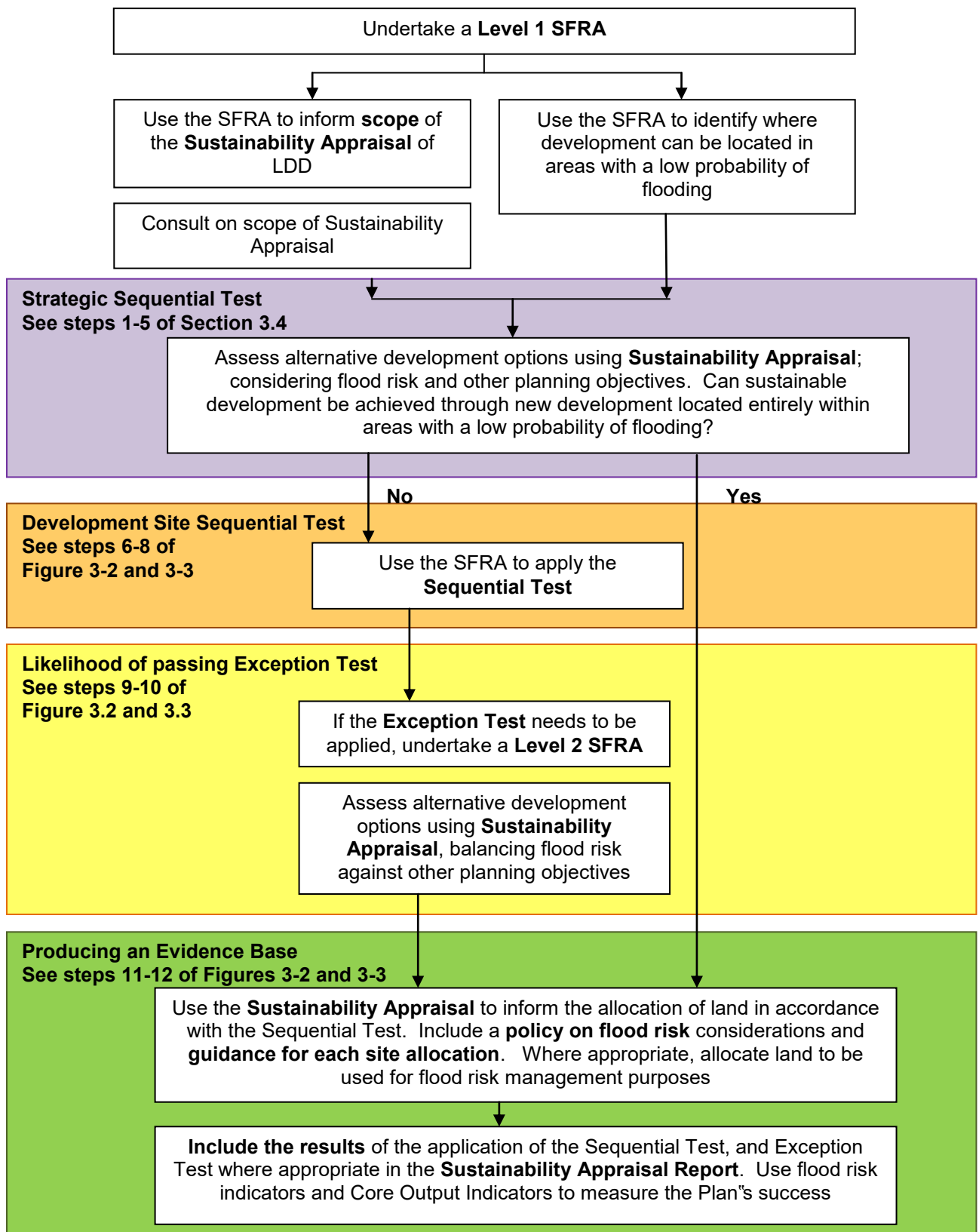
Strategic Sequential Test
Development Site Sequential Test
Likelihood of Passing Exception Test
Producing an Evidence Base

The same colours are used in Figure 3-2 and Figure 3-3 which illustrate the steps in the process of applying the Sequential and Exception tests.

The guidance provided in this North West Yorkshire SFRA Volume I should not supersede PPS25 or other plans and policies, but should be seen as a practical approach to the application of the Sequential Test and Exception Test during preparation of the LDF.



Figure 3-1: Taking flood risk into account in LDDs



## 3.2 Carrying out the Sequential Test and assessing the likelihood of passing the Exception Test

Section 2 of this volume provided a short overview of the Sequential and Exception Tests. Figure 3-1 identified how flood risk is taken into account in LDDs and introduced the use of the Sustainability Appraisal in applying the Sequential and Exception Tests.

PPS 25 does not provide step-by-step guidance on how to apply each Test. This section provides more detailed guidance about how Spatial Planners should apply the Sequential and Exception Tests within the Sustainability Appraisal of LDDs. Following these steps will produce clear and transparent evidence that both the Sequential and Exception Test have been applied. This can feed into the Sustainability Appraisal process of LDDs. The evidence can either be reported within the Sustainability Appraisal itself or a supporting stand alone document which then feeds into the Sustainability Appraisal.

### 3.2.1 Spatial Planning Flow Diagrams and Tables

The following diagrams provide a recommended approach for Spatial Planners when applying the two tests.

During this process the Spatial Planner must identify which sites should be avoided or substituted and which sites can go forward. Once the Sequential Test has been applied the planner may need to assess how likely it is that the site will remain safe by considering the Exception Test.

This is a step wise process and must be documented. It is also a challenging one as a number of the criteria used are qualitative and based on experienced judgement.

Four diagrams have been provided which give an overview of the process. The stages in the process are colour coded (as described in section 3.1) and the colours can be used as a link between the diagrams.

**Figure 3-2** is a flow diagram illustrating the **application of the Sequential and Exception Tests**. This links the inputs from the SFRA (including more detailed Level 2 SFRA information where it would be required), the Core Strategy and Sustainability Appraisal with the desired outputs. The process:

- starts with the LPA assessing alternative development options at a strategic scale using the Sustainability Appraisal
- works down using evidence provided in the Level 1 SFRA (and that may be required in a Level 2 SFRA) to avoid inappropriate development sites, substitute development within the site boundary and identify those sites requiring the Exception Test.
- finally revisits and updates the Sustainability Appraisal with the allocation of development sites

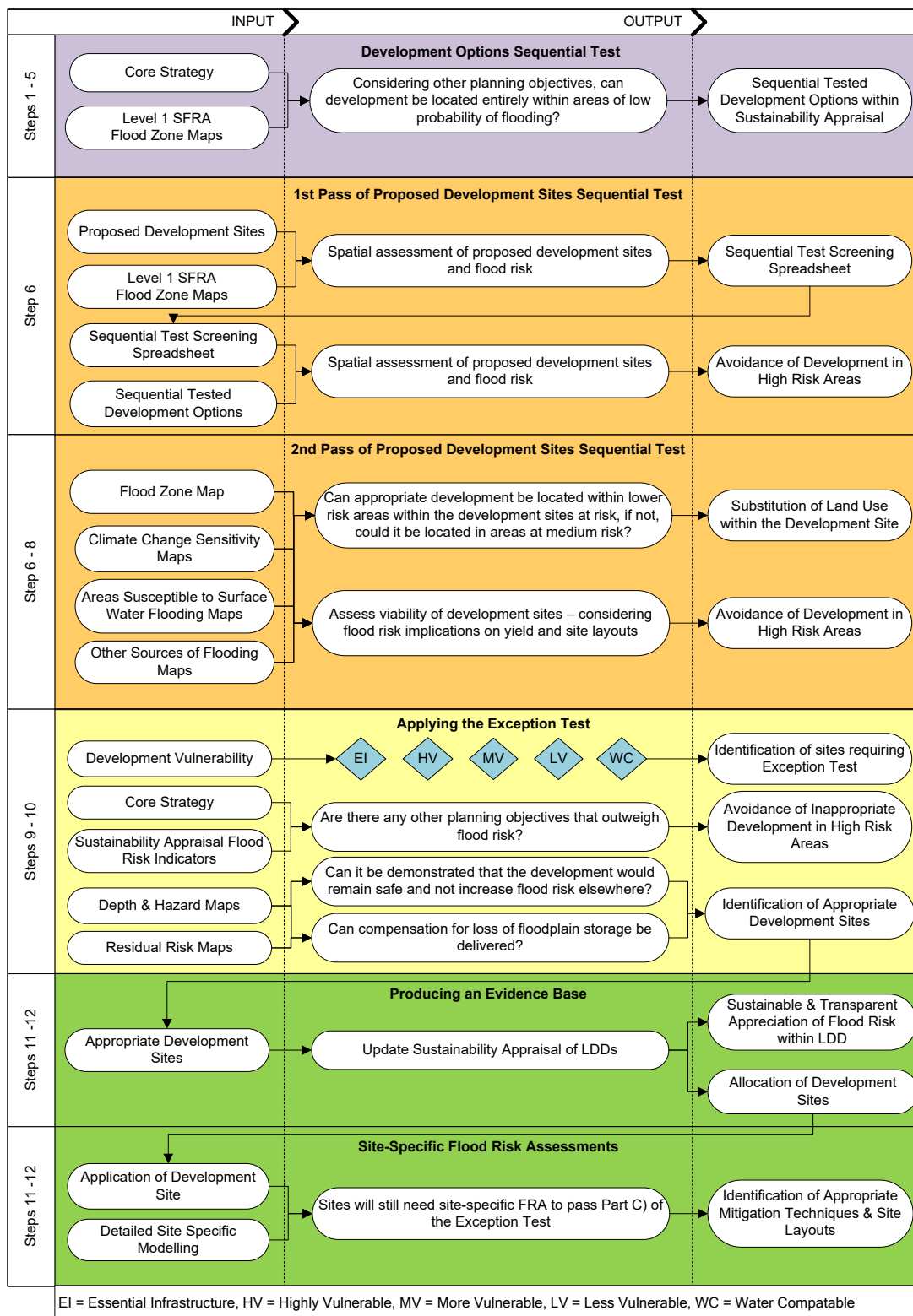
This is closely linked with Figure 3-3 which provides more information for each of the steps outlined in Figure 3-2.

**Figure 3-4** provides more guidance on using **the Sequential Test Spreadsheet** and also the site summary tables produced in the SFRA during the Sequential Test process.

**Figure 3-5** provides guidance on how to **assess the likelihood of sites passing the Exception Test** using key questions and evidence provided in the SFRA in assessing whether a site is likely to remain safe or not. This is discussed in more detail in section 2.

Spatial Planners should use the Sustainability Appraisal process to assess alternative sites against flood risk indicators and other planning considerations. Once this has been completed, the final steps can be carried out, producing the evidence base for the Sustainability Appraisal, allocating appropriate development sites, producing flood risk policies and development guidance.

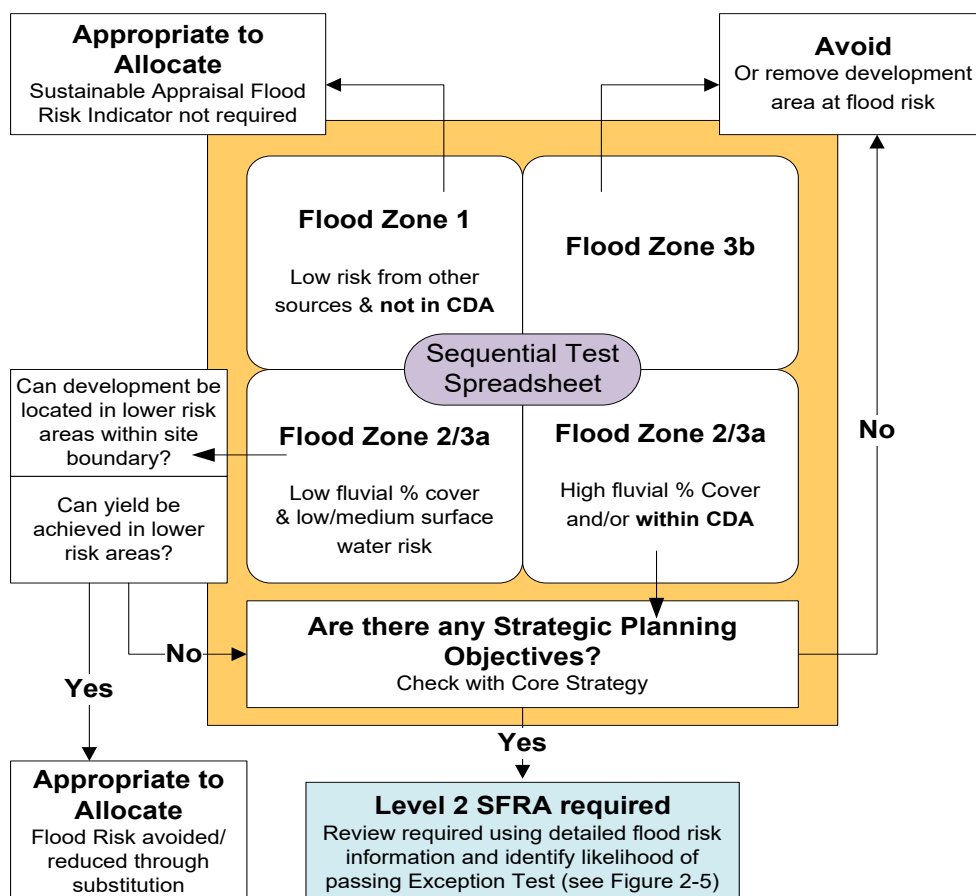
**Figure 3-2: Sequential and Exception Test Flow Diagram**



**Figure 3-3: Sequential and Exception Tests key steps**

<b>Applying the Sequential Test during the SA of Development Options</b>	
Step 1	State the <b>geographical area</b> over which the Sequential Test is to be applied. This can be over the entire LPA area but will usually be reduced to communities to fit with functional requirements of development or objectives within RSS or Core Strategy
Step 2	Identify reasonably available areas of strategic growth
Step 3	Identify the presence of <b>all sources of risk</b> using the evidence provided in this SFRA
Step 4	<b>Screen available land</b> for development in ascending order from Flood Risk Zone 1 to 3, including the subdivisions of Flood Risk Zone 3
<i>This can be achieved using the information provided in the <b>Sequential Test Spreadsheet</b> (See Volume II). This provides a spatial assessment of each proposed development site provided by the LPA against Flood Zones and Environment Agency surface water susceptibility zones</i>	
Step 5	Could all development be located in lower risk areas? If not, move onto the next Steps
<b>1st and 2nd Pass of the Proposed Development Sites Sequential Test</b> <i>Follow Figure 3-4 using the Sequential Test Spreadsheet to:</i>	
Step 6	Identify those sites which should be <b>avoided</b> where risk is considered too great and there are no strategic planning objectives identified in Core Strategy
Step 7	Identify those sites in which the consequence of flooding can be reduced through <b>substitution</b> within the site boundary
Step 8	Assess yield and layout issues for remaining high risk sites to check whether development is viable
<b>Identify the Likelihood of passing the Exception Test</b> <i>Follow Key Questions imbedded within Figure 3-5 and SFRA evidence to identify the likelihood of those sites remaining at risk passing the Exception Test. The summary tables produced in Volume II can help with this process.</i>	
Step 9	Assess the compatibility of the <b>development vulnerability</b> using Table D.2 of PPS25 and identify the requirement of passing the <b>Exception Test</b> using Table D.3 of PPS25
Step 10	Use the SA to assess alternative development options by balancing flood risk against other planning constraints. Proposed sites should be avoided and removed if it is unlikely to pass the Exception Test i.e. if: <ul style="list-style-type: none"> <li>• key Questions in Figure 3-5 suggest significant problems</li> <li>• development will require significant mitigation measures to make the site safe and to reduce impacts downstream</li> <li>• the requirement to provide floodplain compensation cannot be delivered</li> </ul>
<b>Producing an Evidence Base</b> <i>The following steps should be used within the SA to produce the evidence that all Tests have been applied</i>	
Step 11	Produce a supporting stand alone document recording all decisions made during Steps 1 to 10. Each proposed development site should be referenced and the decisions made to avoid, substitute, or allocate the site and the evidence used. This can be incorporated within the appendix of the SA
Step 12	Allocate development allocations within the SA, including appropriate flood risk policies and development guidance on each allocated site. Guidance should include the need for appropriate site-specific FRAs.
<i>The Environment Agency and other relevant stakeholders (such as Yorkshire Water or British Waterways) should be consulted on any policies drafted that inform the application of the Exception Test and the production of FRAs within the LPA area</i>	

Figure 3-4: 1st and 2nd pass of proposed development sites Sequential Test



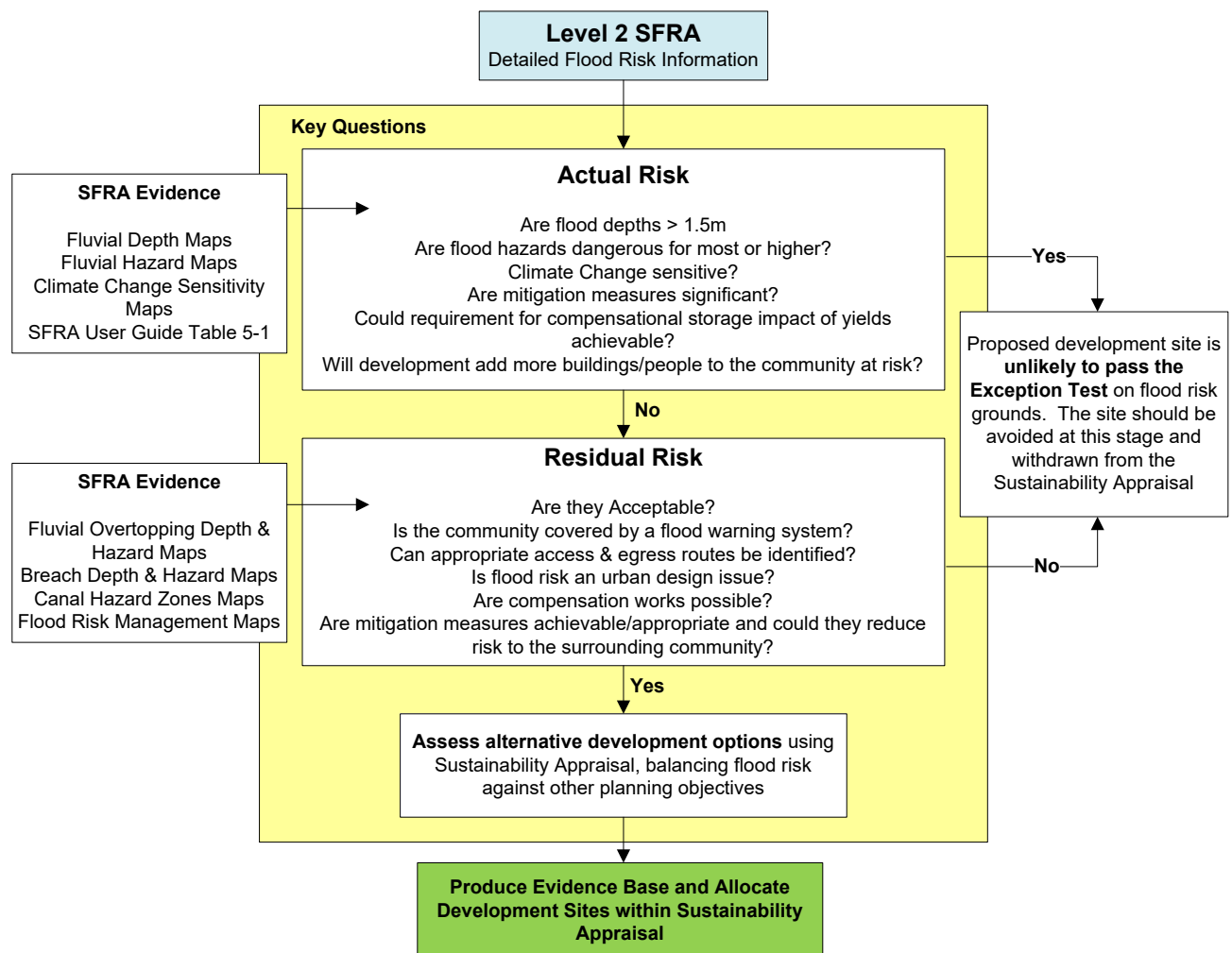
### 3.2.2 Assessing the Likelihood of Passing the Exception Test

The Sequential Test process may identify that some development has to be allocated in sites at risk of flooding where risk cannot be substituted within the site. Spatial Planners will need to assess the likelihood of sites passing the Exception Test. This is seen as a critical part of the spatial planning process by avoiding inappropriate development being allocated. The Environment Agency and/or Development Management are likely to object to inappropriate development. A balance is required but the Exception Test can be a show stopper in that planning permission can only be granted if all criteria of the Exception Test are met.

This is a Level 1 SFRA and further detailed information may be required (via a Level 2 SFRA investigation) at some locations to assess whether a site is likely to pass the Exception Test. The site tables in Volume II identify where there are issues which would require further investigation before assessing the likelihood of passing the Exception Test (for example presence of flood defences).

Figure 3-5 outlines the key questions that Spatial Planners should consider in order to understand the level of flood risk present at a site and identify the likelihood of a site passing the Exception Test.

**Figure 3-5: Identifying the likelihood of passing the Exception Test**





### 3.3 Flood Risk and other Land Use Policies

Flood risk is an important consideration in land use planning and can greatly impact on the sustainability of various land uses in all locations. Once the Sequential Test and Exception Test (where necessary) have been applied, the assessment of associated flood risk information will then influence the land use planning decision at whatever level it is being considered.

Land use policies and wider strategic decisions involving social and economic development in the LDDs will be influenced and shaped by the sequential approach informed by this SFRA.

Green Infrastructure (GI) is a planned and managed network of natural environmental components and green spaces that intersperse and connect the urban centres, suburbs and rural fringe consisting of:

- Open Spaces – parks, woodlands, nature reserves, lakes
- Linkages – River corridors and canals, pathways and cycle routes and greenways
- Networks of “urban green” – private gardens, street trees, verges and green roofs.

Green spaces can be used to manage flood risk including storm flows. It may also free up water storage capacity in existing infrastructure to reduce risk of damage to urban property, particularly in city centres and vulnerable urban regeneration areas. GI can also improve accessibility to waterways and improve water quality, supporting regeneration and improving opportunity for leisure, economic activity and biodiversity.

Richmondshire District Council recommend 10% of new development should be open space<sup>4</sup>. Harrogate Borough Council have an SPD (*Provision of Open Space for New Housing Developments*)<sup>5</sup> which provides guidance about how open space and green infrastructure should be included in new developments.

The Government Officer for Yorkshire and Humber and Natural England have reported on the extent of Green Infrastructure in the area. Further information and maps can be found on the Yorkshire and Humber Environment Hub website at <http://yhub.org.uk/gi> and the Yorkshire and Humber Assembly website at <http://www.yhassembly.gov.uk/>.

The Yorkshire Dales National Park lies upstream of Richmondshire and Craven Districts and land use in the national Park has the potential to affect river flow downstream. The National Park Authority is unlikely to have changes in land use on a scale that will influence downstream flood risk<sup>6</sup>. The Yorkshire Peat Partnership is an umbrella organisation coordinating peatland restoration work in the YDNP, this is discussed in more detail in Volume II, section 1.4.

<sup>4</sup> John Hiles, Strategic Planner, Richmondshire District Council

<sup>5</sup> Harrogate Borough Council, (April 2009). *Provision of Open Space for New Housing Developments*. SPD.

<sup>6</sup> Peter Stockton, Town and Country Planning, Yorkshire Dales National Park, Pers Comm August 2009.

## 4. Guidance for Development Control

*The aim of this Section is to provide guidance on the use of the SFRA by Development Control. Planners should also refer to the guidance on SFRA maps provided on page vii and background to the SFRA and flood risk concepts in Appendix A, C and D.*

*When it comes to individual planning applications, Planners should use the Guidance in this SFRA User Guide, PPS25 and its Practice Guide to:*

- ***Check whether the Sequential Test and/or the Exception Test have already been applied***
  - *Refer developer to LDD and supporting evidence that the Sequential Test has been applied – site may have already been assessed*
  - *Refer developer to LDD and supporting evidence that is likely that development can pass the Exception Test – site may have already been assessed*
  - *If so, Sequential Test and likelihood of passing the Exception Test have been assessed*
- ***Apply the Sequential and Exception Test if necessary, using evidence supplied by the developer, referring them to the following***
  - *North West Yorkshire SFRA Volume II to inform Sequential Test*
  - *Sequential Test Spreadsheet to compare similar sites assessed*
  - *North West Yorkshire SFRA Volume II to inform Exception Test*
  - *North West Yorkshire SFRA Volume II maps to review scale and nature of flood risk*
- ***Consult with Environment Agency and other relevant stakeholders to***
  - *Assess flood risk constraints identified on site using the NW Yorkshire SFRA*
- ***Scope an appropriate FRA***
  - *What is the scale and nature of risk from all sources?*
  - *Does the site lie within a CDA identified in Volume II?*
  - *Refer developers to Section 4, 5 and 6 of this SFRA User Guide*
- ***Consult with Environment Agency over FRA acceptance/approval***

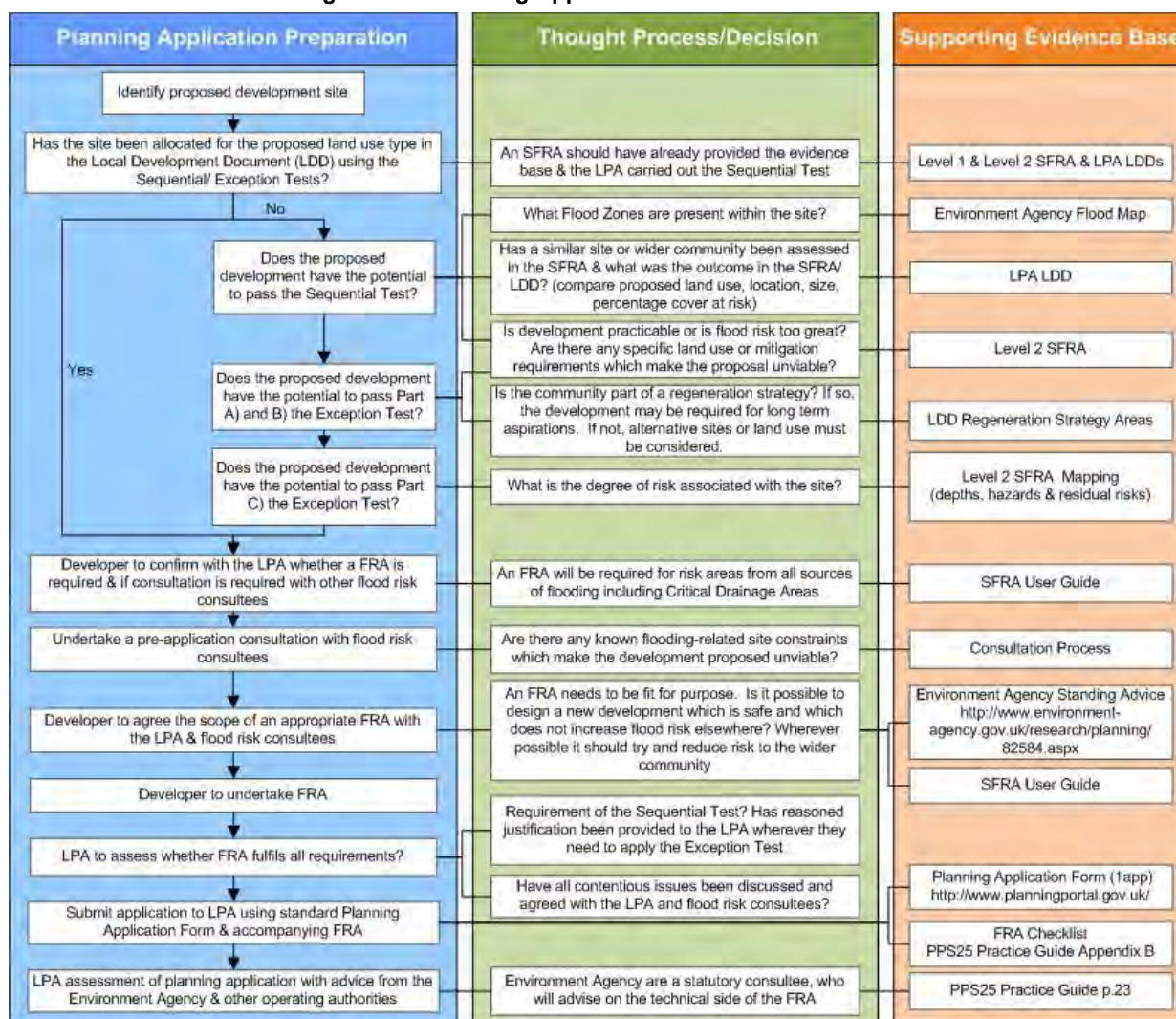
## 4.1 Role of Development Control

The LPA are the main decision-makers on applications for new development. This is carried out through Development Control. It is the overall responsibility of the developer to carefully consider flood risk issues regarding their development site but the LPA should be involved at the earliest possible stage during pre-application discussions.

The Pitt Review has recommended that Development Control must take some roles and responsibilities from the Environment Agency as the first point of contact for Flood Risk Management and planning applications.

The consideration of flood risk within the context of an individual site planning application is shown on Figure 4-1 which highlights how to take account of flood risk using flood risk information provided within the NW Yorkshire Level 1 SFRA, the guidance provided by PPS25 and Environment Agency Standing Advice.

**Figure 4-1: Planning Applications and Flood Risk**



## 4.2 Taking a Strategic View of Development

Development Control officers must always consider development from a strategic view point even though applications for proposed developments are submitted at a site level. Some communities may require a strategic approach when it comes to planning development, due to the possibility of large off site impacts caused by piecemeal development. It should not be presumed that flood risk has been understood at the strategic high level and each application should fit within any flood risk management strategy for an area and flood risk policies in LPA LDDs.

If an individual site has been identified for development, Development Control must check that the development is sound regarding flood risk i.e. it has passed the Sequential Test and it is likely to pass the Exception Test where applicable and that it is supported by a coherent FRA which meets the requirements of PPS25.

## 4.3 Applying the Sequential Test and Exception Test

An overview of the Sequential and Exception Tests is provided in section 2 of this volume. These follow the key principles to manage flood risk by:

- Avoid
- Substitute
- As a last resort Control and Mitigate

Section 4.20 to 4.39 of the PPS25 Practice Guide provides more detail on how to apply the Sequential Test and Exception Test to individual planning applications, windfall sites, existing and single properties and change of use and must be referred to.

### 4.3.1 Sites in a Sequentially Tested DPD

The site may have been through the Sequential Test during the preparation of a DPD. The developer must still apply the sequential approach to site layout and match land use vulnerability to flood risk areas as described in PPS25.

### 4.3.2 Windfall Sites

If a site has not been identified in a Sequentially Tested LDD, the Sequential Test will need to be applied. The developer will need to provide evidence to the LPA that there are no other reasonably available sites where the development could be located. The LPA will then use this information to apply the Sequential Test. This applies particularly to Windfall Sites that have not been allocated in the LDF.

### 4.3.3 The Exception Test

Developers will need to provide evidence that the Exception Test can be passed if it is required. This evidence will be needed for both allocated and windfall sites, depending on the vulnerability of the proposed land use, areas requiring redevelopment or regeneration, redevelopment of existing single properties or changes of use.

Development Control will then need to review the evidence provided and decide whether a site passes the Exception Test. Development in certain communities may find it difficult to pass both the Sequential Test and Exception Test due to the nature of flood risk and/or the scale of mitigation which would be required in order to make the development safe.

More detail about mitigation options is provided in Appendix C of this Volume.

#### 4.3.4 Supporting the FRA Process

All development applications must be supported by an appropriate site-specific FRA in accordance with the guidance provided in Section 3.70 to 3.89 of the PPS25 Practice Guide. Further guidance is also provided in Appendix B and section 5 of this Volume.

Development Control should recommend that:

- At the first possible stage developer should refer to the flood risk mapping in the North West Yorkshire SFRA.
- The developer refers to the appropriate LDD and flood risk policies which could potentially influence their proposed development.
- The Environment Agency Standing Advice should be used at this stage. This can be accessed online at <http://www.environment-agency.gov.uk/research/planning/82584.aspx>

The Environment Agency is a statutory consultee for specific categories of development where flood risk is an issue. Table 4-1 outlines when a more detailed FRA may be required on which the Environment Agency should be consulted.

If the site or community has been identified at risk of flooding from any source, Development Control and the developer should consult the Environment Agency and other relevant flood risk consultees, such as Yorkshire Water or British Waterways, to identify known flood-related site constraints and agree the scope of an appropriate FRA.

Table 4-1: FRA Considerations	
Statutory Considerations <sup>a</sup>	Supporting evidence in the SFRA
The development, other than minor, development is situated in Flood Zone 2 and 3	Volume II Flood Zone Maps
The development exceeds 1ha in size	-
The development is within 20m of the bank top of a Main River – works within 8m of a main river will need the consent of the Environment Agency who are likely to object in principle to any development within these areas.	-
The development involves culverting or controlling flow in any river or stream - the Environment Agency must be consulted	-
Other Considerations	
The development is situated in Flood Zone 1, but there are critical drainage problems (i.e. the development lies within a Critical Drainage Area) or the site has been identified as being at risk of flooding from other sources	Volume II Critical Drainage Area Information
The development is at risk of flooding from other sources of flooding	Volume II Surface water maps
The development is situated behind flood defences (possibility of overtopping during extreme flood event or breach)	Volume II - Defences Maps Volume II depth and hazard May need Level 2 SFRA evidence
a. Consultation with the Environment Agency required under Town and Country Planning (General Development Procedure) (Amendment) (No 2) Order, 2006	

*Please see page iv for map references*



## 5. Guidance for Developers

*The aim of this Section is to provide guidance on the use of the SFRA by Developers. Developers should also refer to the guidance on SFRA maps provided on page vii and background to the SFRA and flood risk concepts in Appendix 0, C and D*

*Developers should use the Guidance in this SFRA User Guide, PPS25 and its Practice Guide to:*

- **Assess whether the site is a**
  - *Windfall site,*
  - *an allocated site which has already been sequentially tested (and where the proposed development is consistent with the allocation),*
  - *within a regeneration area where regeneration has begun and the proposed development contributes towards that regeneration,*
  - *replacement of a single dwelling with another single dwelling,*
  - *a straight change of use application,*
  - *considered a minor development,*
  - *constitutes a use requiring the Exception Test under table D3 of PPS 25.*
  - *to identify if Sequential and Exception Tests are required*
- **Check whether the Sequential Test and/or the Exception Test have already been applied**
  - *Request information from the LPA on whether the Sequential Test or likelihood of the site passing the Exception Test have been assessed*
  - *If not, provide evidence to allow the LPA to undertake the Tests.*
- **Consult with LPA Development Control and the Environment Agency to scope an appropriate FRA if required**
  - *Also refer to Environment Agency Standing Advice, CIRIA Report C624, PPS25 and its Practice Guide*
  - *Guidance on FRAs provided in this SFRA User Guide*
  - *Are there any strategic mitigation requirements identified in the North West Yorkshire SFRA and/or LDD?*
  - *Consult LPA emergency planners if required*
- **Submit FRA to Development Control and Environment Agency for approval**



## 5.1 Introduction

The SFRA provides the evidence base for developers to assess the flood risk to a site at a strategic level and scope an appropriate site-specific Flood Risk Assessment.

Developers should liaise closely with the LPA to determine if a site is suitable for development, and if so what type of development is appropriate, given the application of the Sequential Test and likelihood of passing the Exception Test as required by PPS25. If a site is suitable then developers should prepare a site-specific Flood Risk Assessment, in close liaison with the LPA and Environment Agency.

Developers should consider all sources of flood risk when assessing whether a site is suitable for development. Guidance on developing in Critical Drainage Areas and areas at risk from sources other than fluvial is provided in this section.

Figure 4-1 in the Guidance for Development Control (Section 4 of this volume) provides a useful overview of the consideration of flood risk within the context of an individual site planning application.

## 5.2 The Sequential Test and Exception Test

The Sequential Test and Exception Test are fundamental to PPS25 in determining the suitability of land for development in regard to flood risk. These tests may still be required at an individual site level. Table 5-1 identifies when the Sequential and Exception Tests are required for certain types of development and who is responsible for providing the evidence and those who need to apply the tests. Further information is provided in Section 4 of the PPS25 Practice Guide.

**Table 5-1 Development types and application of Sequential and Exception Tests**

Development/ PPS25 Practice Guide Section	Sequential Test Required	Who Applies the Test?	Exception Test Required	Who Applies the Test?
<b>Allocated site</b>  <b>Sect. 4.20-4.29</b>	Yes	LPA, developer must provide evidence they need to undertake Sequential Test a	Dependent on vulnerability of land use (see Appendix G)	LPA assesses likelihood of test being passed. Developer provides evidence that the test can be passed through a detailed FRA
<b>Windfall site</b>  <b>Sect. 4.30 - 4.32</b>	Yes	LPA, developer must provide evidence they need to undertake Sequential Test a	Dependent on vulnerability of land use (see Appendix G)	LPA assesses likelihood of test being passed. Developer provides evidence that the test can be passed through a detailed FRA
<b>Regeneration sites identified in LDD</b>  <b>Sect. 4.33 - 4.35</b>	No - if regeneration has begun as part of a formal regeneration plan and the development contributes towards the regeneration.		Dependent on vulnerability of land use (see Appendix G)	Developer provides evidence that the test can be passed to the LPA through a detailed FRA
<b>Redevelopment of existing single properties</b>  <b>Sect 4.36</b>	No		Dependent on vulnerability of land use (see Appendix G)	Developer provides evidence that the test can be passed to the LPA through a detailed FRA
<b>Changes of use</b>  <b>Sect. 4.38</b>	No		Dependent on vulnerability of land use (see Appendix G)	Developer provides evidence that the test can be passed to the LPA through a detailed FRA
<b>Minor Developments<sup>b</sup></b>	No	-	No	-

a. PPS25 Practice Guide section 4.24 provides some guidance

b. PPS25 (section 20) defines minor development as:

-minor non residential extensions (with a footprint of less than 250m<sup>2</sup>)

-alterations that do not increase the size of buildings

-'Householder' development (e.g. sheds, garages) within the curtilage of the existing dwelling in addition to physical extensions of the dwelling (excluding proposed developments that would create a separate dwelling within the curtilage of the existing dwelling).

## 5.3 Site specific Flood Risk Assessments

The preparation of site specific Flood Risk Assessments (FRAs) are the responsibility of those proposing development. The main aims of a FRA are to determine the acceptable management of flood risk to the proposed development and any impacts elsewhere, and to ensure that the development and its users/occupants remain safe in times of flood.

Once the site has been through the Sequential Test and has been identified as being likely to pass the Exception Test a site-specific FRA should be undertaken. The LPA and Environment Agency should be consulted in order to scope the content and level of the FRA.

There are three levels of FRA:

- **Level 1** - Screening study, to identify whether there are any flooding or surface water management issues that need to be considered further;
- **Level 2** - Scoping study, to be undertaken if the Level 1 FRA indicates that there are flood risk issues needing further consideration and these risk can be readily quantified; and
- **Level 3** - Detailed study, where further quantitative analysis is required to appropriately assess flood related issues and determine any effective mitigation measures needed to be put in place.

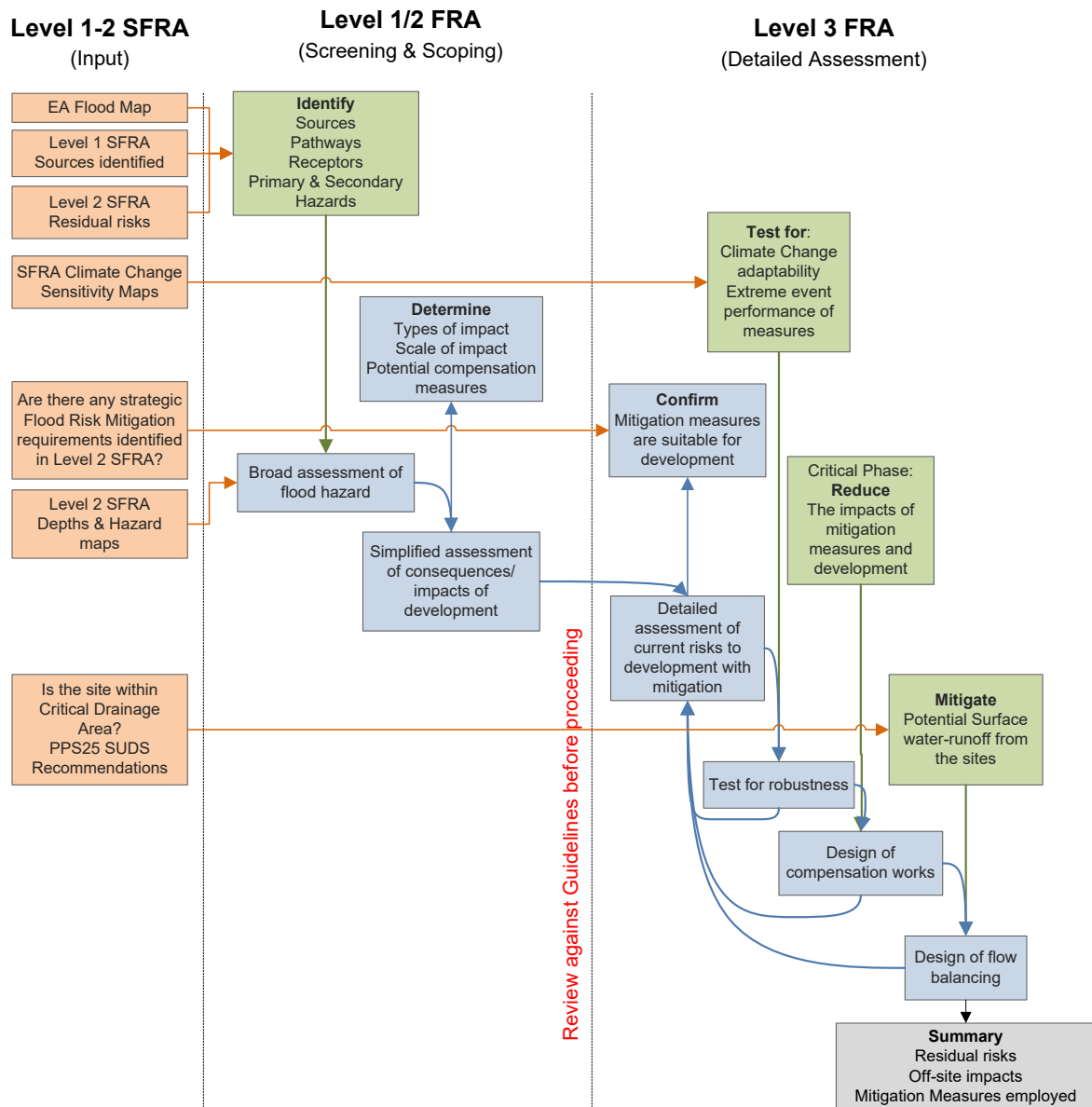
The detail required for each level of FRA is highlighted in Figure 5-1. This figure also links the evidence provided in the North West Yorkshire Level 1 SFRA which can aid the decision making process. Appendix C of this Volume should also be referred to regarding appropriate mitigation measures.

It should be recognised that the SFRA has assessed flood risk at a strategic level, which can be used to provide evidence for a Level 1 and Level 2 FRA. A FRA for a site needs a more detailed assessment. The SFRA can be used to scope out flood risk issues and referring to the guidance in the SFRA User Guide, PPS25, its Practice Guide and CIRIA Report Development and Flood Risk.

Figure 5-1 scopes when a more detailed FRA is likely to be required. Table 4-1 summarises FRA considerations. The actual scope of the FRA should be agreed between the developer, LPA and Environment Agency before it is undertaken.

*Please see page iv for map references*

Figure 5-1: FRA Preparation



Please see page iv for map references

## 5.4 FRA Guidance

Flood Risk Assessments should follow the approach recommended by:

1. The Environment Agency Standing Advice – this can be found at the website below (<http://www.environment-agency.gov.uk/research/planning/82584.aspx>)
2. CIRIA Report C624 Development and Flood Risk – Guidance for the Construction Industry
3. PPS25 and its Practice Guide - section 3

These documents describe when a FRA is required and what it should contain. They guide developers to produce a “fit for purpose” FRA. The FRA should answer the following questions:

**Table 5-2: Flood Risk Assessment Questions**

FRA Questions	SFRA and other Sources of Information
<b>Development Description and Locations</b>	
<ul style="list-style-type: none"> <li>What is the type of development and where will it be located?</li> </ul>	
<ul style="list-style-type: none"> <li>What is the vulnerability classification of the current and future use of the development site?</li> </ul>	Table D.2 of PPS25
<ul style="list-style-type: none"> <li>Has the development site been assessed during the Level 1 SFRA?</li> <li>Is Level 2 SFRA assessment required at the site?</li> <li>Have the Sequential and Exception Test already been applied?</li> </ul>	SFRA Sequential Test Spreadsheet and Site Tables (Vol II - Sections 7, 8 and 9). Guidance in section 2 about Sequential and Exception Test
<b>Definition of Flood Hazard</b>	
<ul style="list-style-type: none"> <li>What sources of flooding could affect the site?</li> </ul>	SFRA Mapping
<ul style="list-style-type: none"> <li>For each source, how would flooding occur, referencing any historical records where these are available?</li> </ul>	SFRA Mapping
<ul style="list-style-type: none"> <li>What existing surface water drainage requirements are present on the site?</li> </ul>	See Section 5.5 on CDAs and consult with LPA, Environment Agency and Yorkshire Water
<b>Probability</b>	
<ul style="list-style-type: none"> <li>Which Flood Zones are present within the site?</li> </ul>	SFRA and Flood Zone Maps
<ul style="list-style-type: none"> <li>What actual and residual risks are associated with the site?</li> </ul>	SFRA FRM, indicative depth and hazards
<ul style="list-style-type: none"> <li>What are the existing rates and run-off volume generated by the site?</li> </ul>	
<b>Climate Change</b>	
<ul style="list-style-type: none"> <li>How is flood risk at the site likely to be affected by climate change?</li> </ul>	See climate change maps
<b>Flood Risk Management Measures</b>	
<ul style="list-style-type: none"> <li>How will the site be protected from flooding, including the potential impacts of climate change, over the development's lifetime?</li> </ul>	Developers should refer to Appendix C of this Volume for details on appropriate mitigation
<b>Off Site Impacts</b>	
<ul style="list-style-type: none"> <li>How will the proposed development be designed to not increase flood risk elsewhere and where achievable reduce flood risk to the surrounding community?</li> <li>Will measures be implemented to protect the site from flooding and prevent run-off affecting other areas?</li> </ul>	
<b>Residual Risks</b>	
<ul style="list-style-type: none"> <li>What flood-related risks will remain after mitigation measures have been implemented to protect the site from flooding?</li> </ul>	
<ul style="list-style-type: none"> <li>How, and by whom, will these risks be managed over the lifetime of the development?</li> </ul>	Section 6 of this Volume - guidance on developing an Emergency Flood Plan for a development site.

## 5.5 Considering ‘other’ sources of flooding

Flood Risk Assessments must take account of flood risk from all sources, rather than concentrating on fluvial, tidal or surface water flood risk. The North West Yorkshire SFRA Volume II has gone some way in identifying the presence of these sources. This SFRA has carried out some detailed assessment of surface water flooding and collected information from Yorkshire Water and the Fire and Rescue Service these indicate locations where flooding from other sources may be important. Detailed Level 2 SFRA investigations may be required in some locations.

### 5.5.1 Canals

The Leeds and Liverpool canal runs through rural parts of Craven District and passes through Skipton. The Springs Branch of the canal is a short length in Skipton town centre. The Ripon canal is a 2.5 km length of waterway which connects Ripon town centre with the River Ure. The residual flood risk associated with these should be considered in an appropriate FRA. Assessment of the residual risk associated with these canals is recommended in a level 2 SFRA. The developer should liaise with the LPA and British Waterways to determine applicable emergency planning arrangements. Level 2 SFRA investigations should include liaison with British Waterways to identify residual risks from the canals.

### 5.5.2 Reservoirs

As part of a FRA, the developer should undertake a zone of search around their site to identify any reservoirs that lie on higher land. Where larger reservoirs are identified, that fall within existing legislation, the developer should liaise with the LPA, Environment Agency and reservoir undertaker to determine applicable emergency planning arrangements.

Where this identifies smaller reservoirs, the FRA should determine the owner and maintenance regime of the reservoir. A more detailed investigation of the effects of the reservoir overtopping or failing should be undertaken. The developer should then liaise with the LPA and reservoir owner to determine applicable emergency planning requirements or mitigation needs. Where there is significant flood hazard identified to the site from such failure, and especially from unmaintained reservoirs, the developer should liaise closely with the LPA about the suitability of the site for development.

### 5.5.3 Groundwater

Groundwater flooding is not a significant risk in Harrogate Borough, Craven District and Richmondshire District but it should not be dismissed as a possibility and the FRA should consider the potential mechanisms that could affect the development site, as outlined in Volume II. If a risk of groundwater flooding is found, developers should consult with the LPA and Environment Agency at an early stage as to the next steps.

### 5.5.4 Surface Water

This is discussed in Appendix A and Volume II (section 4.4).

### 5.5.5 Sewers

Where the SFRA has identified that there is a risk from surface water flooding, any water that surcharges the sewer system would be expected to follow similar flow paths and pond in similar low spots. The volume of water that emerges from the system will depend on the reason for the network surcharging (e.g. rainfall beyond the design level of the sewer system, sewer capacity issues or blockage or failure).

Developers should take account of the guidance for developing in CDAs where appropriate and liaise closely with Yorkshire Water over any localised sewer flooding problems that could affect the site. Known sewer flooding locations are prioritised for investment by Yorkshire Water and may be the subject of future investment. Future development should be designed so that it does not contribute to existing sewer flooding problems.



## 5.6 Critical Drainage Areas

In certain locations known to be susceptible to localised flooding (e.g. as a result of problematic surface water drainage, or problems with sewer network capacity), an increase in the rate of surface water runoff and/or volume from a new development situated upstream may exacerbate the degree of flood risk to that downstream area. Such areas will be sensitive to the drainage system implemented with that particular development site, as the drainage system will determine site runoff rates and volumes. These areas have been defined as Critical Drainage Areas (CDAs). Critical Drainage Areas are discussed in the NW Yorkshire SFRA Volume II (section 4.6), these are based on areas of surface water flood risk and where the sewer network may be at capacity.

In CDAs, a detailed FRA would be expected regardless of which Flood Zone that applies. This should demonstrate that new development is not at risk from flooding from existing drainage systems. It should also demonstrate that the development will not adversely affect existing flooding conditions by the use of appropriate mitigation measures and should define and address the constraints that will govern the design of the drainage system and layout of the development site.

In addition to this, Category 4 of the Code for Sustainable Homes requires developers to ensure that peak run-off rates and run-off volumes will be no greater than the pre-development conditions as a minimum. The code recommends that attenuation should be related to the degree of flood risk in an area.

*„The percentage peak time attenuation should be provided as follows*

- 50% in low flooding risk areas
- 75% in medium flooding risk areas
- 100% in high flooding risk areas<sup>7</sup>

Planning Policy Statement 18 allows local planning authorities to stipulate high levels of the code where there are local circumstances that allow and warrant it. As such, LPAs can designate CDAs as high flood risk areas.

Detailed surface water flood maps have been produced as part of the Level 1 SFRA, these identify areas where there is a risk of surface water flooding from rainfall. It should be noted that there may be additional areas that contribute flows through the sewer system into CDAs. A record of flooding from sewers (DG5 register) was provided by Yorkshire Water. This identifies locations where there has been flooding (internal or external) of property in the past. It may include properties which benefit from recent improvements/ upgrades to the sewer network where the risk of flooding has now decreased.

Ideally the LPA should work closely with the Environment Agency, Yorkshire Water and developers to enable surface water runoff to be controlled as near to the source as possible. For Greenfield developments, the aim is not to increase runoff from the undeveloped situation and for Brownfield re-developments, to reduce existing runoff rates. Developers should liaise closely with the Environment Agency, Yorkshire Water and LPA to determine an appropriate reduction in runoff rate and volume with reference to discharge limits as laid down by any completed SWMP or drainage strategy for that area.

Wherever possible, this should be achieved through the implementation of Sustainable Drainage Systems (SuDS), constructed within the boundaries of the development site. More detail on SuDs is available in Appendix H. Surface water flow paths should be identified in more detail as part of any Level 2 SFRA for CDAs. These should be opened up and water safely routed using Green Infrastructure. Opportunities should be taken where possible to

<sup>7</sup> DCLG (2006) *Code for Sustainable Homes*

<sup>8</sup> DCLG (2007) *Planning Policy Statement: Planning and Climate Change - Supplement to Planning Policy Statement 1*

hold back surface water within these areas, which can reduce surface water flood risk to existing properties downstream.

The effectiveness of a flow management scheme within a single site is heavily limited by site constraints including (but not limited to) topography, geology (soil permeability), development density, adoption issues and available area. The design, construction and ongoing maintenance regime of such a scheme must be carefully defined at an early stage and a clear and comprehensive understanding of the catchment hydrological processes (i.e. nature and capacity of the existing drainage system) is essential.

## 6. Guidance for Emergency Planners

*The aim of this Section is to provide guidance on the use of the SFRA by Emergency Planners. Developers should also refer to the guidance on SFRA maps provided on page vii and background to the SFRA and flood risk concepts in Appendix A, B and C.*

*Emergency Planners should use the Guidance in this SFRA User Guide, PPS25 and its Practice Guide to:*

- **Update Multi-agency Flood Plans**  
*Using the overall assessment of flood risk provided in the Level 1 SFRA*
- **Inform LDDs**  
*Using the outputs provided in the Level 1 SFRA to advise about flood access to sites.*
- **Provide advice on developer Flood Evacuation Plans for new development**  
*Using outputs from the Level 1 SFRA*
- **Raise awareness of flood risk from all sources**  
*Using outputs from the Level 1 SFRA*

### 6.1 Introduction

This section provides guidance on how Local Authority Emergency Planners can use the outputs of the SFRA to update Multi-agency Flood Plans and provide advice on Flood Plans written by developers for new development.

## 6.2 Emergency planning overview

Under the Civil Contingencies Act (2004) Harrogate BC, Craven DC and Richmondshire DC are classified as category 1 responder. During emergencies, such as a flood event, the local authorities must cooperate with other category 1 responder (including the emergency services and the Environment Agency) to provide the core response to most emergencies.

Under the Civil Contingencies Act, the Local Authority holds a statutory duty to provide civil protection to their communities to ensure human welfare, environmental stability and UK security are not affected. Under the Act, risk assessments and planning is arranged through Local and Regional Resilience Forums (LRF/RRF).

Harrogate, Craven and Richmondshire Councils are part of the North Yorkshire Local Resilience Forum<sup>9</sup>. The LRF was set up to organise a coordinated response to major incidents across the area and consists of representatives from the Emergency Services, Local Authorities, Health, Environment Agency and other professional and voluntary agencies. The NYLRF has prepared and updates a community risk register (CRR) which considers the likelihood and consequence of the most significant risks facing the area over the next 5 years<sup>10</sup>.

Harrogate, Craven and Richmondshire Councils (with North Yorkshire County Council) are also involved in emergency planning at a local level and providing information to residents through a variety of methods. For example Craven provide information to residents on responding to emergencies which includes flooding<sup>11</sup>. Harrogate BC and Richmondshire DC websites provide general information about their responsibilities<sup>12 13</sup>.

SFRA recommendations are that development should be avoided in flood risk areas. However, there is currently development in flood risk areas and there will need to be a level of continued regeneration. Emergency Planners should be involved in the development of LDDs where relevant, for example providing advice about flood access and egress issues. Flood defences go some way in reducing the flood risk, however there is still a residual risk associated with them as they can be overtopped or breached. Flood Warning is an integral part of flood risk management. The Environment Agency is the lead authority responsible for warning the public, local authorities and emergency services.

<sup>9</sup> <http://www.nysp.org.uk/html/top-links/north-yorkshire-resilience-forum>

<sup>10</sup> <http://www.nysp.org.uk/html/top-links/north-yorkshire-local-resilience-forum/nylrf/community-risk-register>

<sup>11</sup> <http://www.cravencdc.gov.uk/Craven/Residents/EmergencyPlanning/>

<sup>12</sup> <http://www.harrogate.gov.uk/immediacy-237>

<sup>13</sup> <http://www.richmondshire.gov.uk/your-council/emergency-planning.aspx>

## 6.3 Flood Plan Recommendations

Along with the Environment Agency Flood Warning systems, there are a range of Flood Plans at a regional and local level, outlining the major risk of flooding and the tactical and operation plan for key responders. These plans are incorporated in Local Authority Multi Agency Flood Plans.

The North West Yorkshire SFRA Volume II provides a number of flood risk data sources that should be used when producing or updating flood plans. The detailed maps and GIS layers provided should be made available for consultation by emergency planners during an event. Reports should be updated to reflect the current understanding of the possibility, likelihood and spatial distribution of all sources of flooding including fluvial, surface water and sewer and man-made bodies of water (such as canals and reservoirs) as discussed in the Level 1 SFRA (Vol II) and associated mapping.

Plans currently in place or under preparation in Harrogate, Craven and Richmondshire are given in the following table:

Table 6-1: Plans Relevant to Flooding		
Harrogate Borough	Craven District	Richmondshire District
<ul style="list-style-type: none"> <li>• Incident Response Scheme</li> <li>• Multi Agency Flood Response Plan</li> <li>• Harrogate Floor Handbook</li> <li>• Community Resilience Scheme</li> <li>• Emergency Contacts Directory</li> <li>• Local Reception Centre Plan</li> <li>• Sandbag Distribution Scheme</li> </ul>	<ul style="list-style-type: none"> <li>• Environment Agency Flood Warning Plan for Craven (2008)</li> <li>• Craven Multi Agency Flood Plan (in progress)</li> <li>• Craven Flood Response Plan (in progress)</li> </ul>	<ul style="list-style-type: none"> <li>• Richmondshire Multi Agency Flood Plan (in progress)</li> </ul>

The data in the North West Yorkshire SFRA Volume II can also be used to:

- Consider the need for evacuation plans for existing vulnerable institutions and people in the floodplain and other areas at high flood risk
- Consider reviewing and updating safe evacuation routes and access routes for emergency services from any existing area of flood risk to rest centres, avoiding routes that may be flooded
- Continue to update the relevant sections of the North Yorkshire Community Risk Register (CRR)

## 6.4 Planning Approval – Flood Evacuation Plans

As a condition of planning approval flood evacuation plans should be provided by the developer. These describe how to safely evacuate people out of flood risk areas, without using emergency service resources. These plans should detail any prearranged emergency arrangements including dry evacuation routes, flood warning, location of rest centres and safe havens.

- Developers should consult with Local Authority Emergency Planners who can:
- Advise on the content of the flood evacuation plan for a particular site during its development
- Assess whether the plan is adequate
- Advise on the longer term communication of the plan to future occupants of a site so the plan remains effective for the lifetime of the development

It is recommended that any flood evacuation plan written is forwarded onto Harrogate, Craven and Richmondshire Councils as appropriate and the Environment Agency for review. Where appropriate evacuation plans should be included in Community Resilience Schemes and Plans. Communities at risk may also be integrated into Multi Agency Response Plans as these are updated.

According to the PPS25 Practice Guide, flood warning and evacuation plans should include the information highlighted in Table 6-2. The table shows where relevant information is provided in the North West Yorkshire SFRA Volume II and other sources of information. A site specific FRA for a development should provide more detailed analysis and inform the plan for a particular site.

Table 6-2 Flood Warning, Evacuation Plans and SFRA Evidence		
	SFRA Information	Other Source of Information
<b>How flood warning is to be provided</b>		
Availability of existing flood warning system	SFRA Volume II Maps E (C1-6, H1-19, R1-7) -	Environment Agency
Rate of onset of flooding		Detailed site specific FRA
How flood warning is given	SFRA Map of Flood Warning Areas	Environment Agency
<b>What will be done to protect the development and contents</b>		
How easily damaged items will be relocated	-	
The availability of staff/occupants/users to respond to a flood warning	-	Vulnerability of proposed development
The time taken to respond to a flood warning	-	Vulnerability of proposed development
<b>Ensuring Safe occupancy and access to and from the development</b>		
Occupants awareness of the likely frequency and duration of flood events	SFRA Volume II Maps A (C1-10, H1-26, R1-13)	Environment Agency / Local Authority communication and community engagement activities.
Designing and location safe access routes	SFRA maps of flood zones, depth and hazard.	Advice from Local Authority Emergency Planners including input to LDDs
Preparing evacuation routes	SFRA maps of flood zones, depth and hazard.	Advice from Local Authority Emergency Planners including



Table 6-2 Flood Warning, Evacuation Plans and SFRA Evidence		
	SFRA Information	Other Source of Information
		input to LDDs
Identify safe locations for evacuees	SFRA maps of flood zones, depth and hazard.	Advice from Local Authority Emergency Planners including input to LDDs
Vulnerability of occupants	SFRA Volume I Appendix G	
Expected time taken to re-establish normal use following an event	-	
Rate of onset of flooding	-	Detailed site specific FRA
How flood warning is given	-	Environment Agency

*Please see pages iv for map references*

## 6.5 Flood Awareness

Emergency Planners should also use the outputs from this SFRA (volume II) as part of their ongoing work to engage with local communities. This should include raising awareness of measures that people can take to make their homes more resilient to flooding from all sources and encouraging all those at fluvial flood risk to sign up to the Environment Agency's Floodline Warnings Direct service.

## Appendices

## A. Flood Risk Concepts

### A.1 Introduction

Flooding is a natural process and can happen at any time in a wide variety of locations. It constitutes a temporary covering of land not normally covered by water and presents a risk when people, human and environmental assets are present in the area which floods. Assets at risk from flooding can include housing, transport and public service infrastructure, commercial and industrial enterprises, agricultural land and the environmental and cultural heritage.

Climate change predictions are that flood risk will increase due to more frequent severe storms bringing higher intensity rainfall and increasing run-off from land and buildings. This will cause rivers and streams to experience higher than normal flood flows and levels, and sewers and drains to surcharge more frequently than at present. The focus of activity in meeting these challenges will in future be on flood risk management as opposed to simply providing flood defences. It is now widely recognised that whilst we can't always prevent flooding occurring we can manage the risks of it happening and reduce the consequences when flooding does happen.

All operating authorities (Environment Agency, Local Authorities, Internal Drainage Boards), should embrace effective flood risk management issues and actions, and aim to reduce flood risks through a variety of measures including:

- Ensuring planning activities locate vulnerable land uses away from high flood risk areas;
- Providing flood warning and emergency planning activities in flood risk areas;
- Generally raising awareness of flood risks amongst vulnerable communities;
- Constructing and maintaining appropriately designed surface water sewers and culverts;
- Using temporary and demountable flood defences and various flood prevention systems to buildings where appropriate;
- Constructing new flood defences where they are sustainable, and improving and maintaining those already existing and;
- Constructing weirs, sluices and other flood flow control/management structures.

Pro-active land use planning has a key role to play in flood risk management as it is one of the few activities that can result in the avoidance of flood risk as opposed to other activities that can only hope to reduce it. Effective flood risk management through the planning system is achieved through a hierarchy where:

- **Avoidance** of inappropriate development in high risk zones must take priority, before
- **Substitution** of lower vulnerability uses where avoidance is not possible is considered.
- Only if avoidance and substitution are not possible, **Mitigation** of the risks through a variety of techniques should be used.

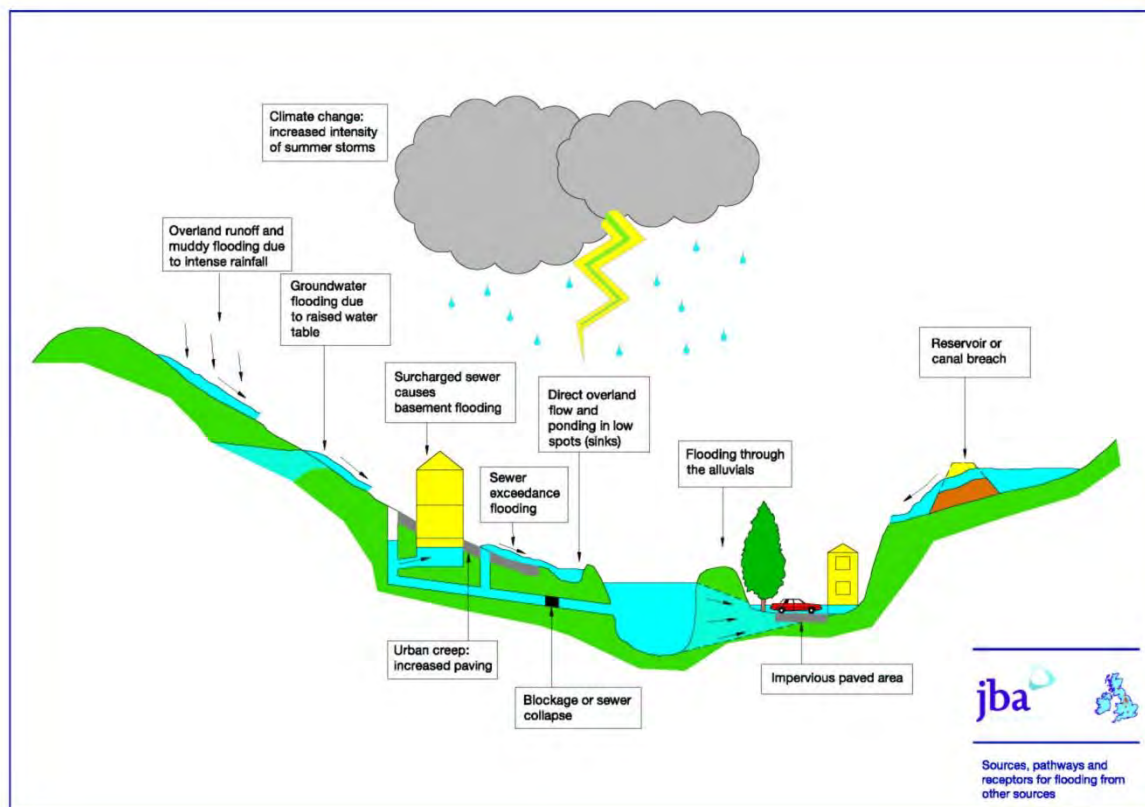
Flood risk assessment at all levels of planning and for all major developments is critical to inform decision making by planners and developers.

## A.2 Sources of Flooding

Flooding can occur from many different and combined sources and in many different ways. Different types and forms of flooding present a range of different risks and the flood hazards of speed of inundation, depth and duration of flooding can vary greatly. See Figure A-1 below.

With climate change, the frequency, pattern and severity of flooding are expected to change and become more damaging.

**Figure A-1: Flooding From All Sources**



Flooding in urban areas can come from a variety of sources and when flooding occurs it is often not clear where the water has come from. The draft „Floods and Water Management Bill“ defines local flood risk, for which local authorities will have a local leadership role, as the risk of flooding from ordinary watercourses (smaller watercourses that are not under the jurisdiction of the Environment Agency), surface water and groundwater.

Before the major flood events in summer 2007, non Main River flooding was based on anecdotal evidence or described with Critical Ordinary Watercourse (COW) investigations undertaken by the Environment Agency. Little data could be abstracted from the water companies on sensitive drainage catchments where runoff impacts of new development could be significant on combined sewer systems. However, a significant proportion of recent flood insurance claims are due to flooding from non main river sources, so this issue may increase under future climate change scenarios.

Historically the adopted approach in many SFRAs has been not to consider other sources of flooding as a spatial or strategic issue. Good design and attenuation of drainage inputs to sensitive watercourses and mitigation was the accepted way forward.

Summer 2007 provided a stark reminder that the significance of capacity exceedance of artificial and natural drainage systems can be severe for many communities. Therefore a clear example was provided that flooding from all sources should be scoped into a SFRA, and that new methods of rapid screening of these risks are required. On the back of the Pitt

review, the Environment Agency has prepared a national map showing areas vulnerable to surface water flooding. This was developed by JBA from research for the Making Space for Water programme and has been used within this SFRA.

- Increases in flooding impacting on people and property, due to development can be caused:
- Upstream by restricting the capacity and conveyance function of the watercourse and floodplain system;
- Downstream by decreasing the volume available for flood storage on the floodplain, altering flow routes on the floodplain or by changes to the channel which can increase the flow discharged to downstream locations; and
- By increasing run-off from reduced permeability surfaces, such as roads, roofs and car parks.

## A.3 Major causes of flooding include:

### Fluvial Flooding

Flooding of watercourses is associated with the exceedance of channel capacity during higher flows. The process of flooding on watercourses depends on a number of characteristics associated with the catchment including; geographical location and variation in rainfall, steepness of the channel and surrounding floodplain and infiltration and rate of runoff associated with urban and rural catchments. Generally there are two main types of catchments; large and relatively flat or small and steep, the two giving two very different responses during large rainfall events.

According to PPS25, *“in a large, relatively flat catchment, flood levels will rise slowly and natural floodplains may remain flooded for several days, acting as the natural regulator of the flow. In small, steep catchments, local intense rainfall can result in the rapid onset of deep and fast-flowing flooding with little warning. Such “flash” flooding, which may only last a few hours, can cause considerable damage and possible threat to life.”*

The form of the floodplain, either natural or urbanised, can influence flooding along watercourses. The location of buildings and roads can significantly influence flood depths and velocities by altering flow directions and reducing the volume of storage within the floodplain. Critical structures such as bridge and culverts can also significantly reduce capacity creating pinch points within the floodplain. These structures are also vulnerable to blockage by natural debris in the channel or by fly tipping and waste.

### Surface Water Flooding

Flooding of land from surface water runoff is usually caused by intense rainfall that may only last a few hours and follows natural valley lines, creating flow paths along roads and through and around developments and ponding in low spots, which often coincide with fluvial floodplains in low lying areas. Hence any area at risk of fluvial flooding will almost certainly be at risk of surface water flooding.

Flooding in urban areas can also be attributed to sewers. Sewers are designed to a 1 in 30 year design standard and hence sewer flooding problems will often be associated with more frequent storm events, when sewers can become blocked or fail. In the larger events that are less frequent but have a higher consequence, surface water will exceed the sewer system and flow across the surface of the land, often following the same flow paths and ponding in the same areas as overland flows.

Both „Making Space for Water“ and „Future Water“ recognise the importance of integrated urban drainage and the summer flooding of 2007 highlighted that surface water flooding can cause mass distress, damage and disruption. The Foresight Report (2004) estimated that 80,000 properties are at very high risk from surface water flooding (1 in 10 chance of occurring in any one year).

The Environment Agency has recently produced a national Surface Water Flood Map, which identifies areas vulnerable to surface water flooding during an extreme rainfall event. This is valuable at providing an indication of the likelihood of surface water flooding, which is separated into areas at less, intermediate or high risk of surface water flooding. Urban drainage modelling is a complex field, varying from simple topographic analysis, to routing of water over an elevation model (which is how the National Surface Water Flood Map has been produced), to network models of the sewer system linked to overland routing, to fully integrated river, sewer and overland models. The data, budget and time required increases with complexity. SFRAs require a strategic assessment of the likelihood of surface water flooding for which overland routing is suitable and appropriate.

It must be noted that these maps were created at a national level. Where possible flow routes underneath structures (i.e. railway embankments, motorways, bridges etc.) have been included in the underlying topography, however there may be instances where this has not been done. Also the capacity of the sewer system in removing a volume of the rainfall or

infiltration rates of Greenfield land has not been included. This is difficult at a national level, therefore it would be expected that the maps are slightly over estimating flood extents.

## Groundwater Flooding

There are several mechanisms which produce groundwater flooding<sup>14</sup>, these include:

- Prolonged rainfall - This mechanism for groundwater flooding is associated with, but not particular to, Chalk Aquifer areas.
- High in bank river levels - a particular problem in very large river basins with a large catchment, long flood durations and wide valleys with extensive alluvial deposits. Occurs in situations where the in bank river water level is at a higher elevation than the surround floodplain.
- Artificial obstructions – can exacerbate groundwater flooding within floodplains by placing artificial obstructions such as foundations into the ground: creating impermeable boundaries, damming groundwater up gradient and causing the groundwater levels to rise
- Groundwater rebound - Groundwater levels in an area can be kept artificially depressed through groundwater abstraction; if these activities are stopped, groundwater will rise or „rebound“ to their natural level. This rise in groundwater levels may cause once dry spring lines to start discharging groundwater.
- Mine water rebound - When mine dewatering ceases, mine water levels rise as water enters the system through mine entries and permeable strata. As levels rise, mine water can start to issue from previously dry adits, shafts etc., as increased water levels allow water to flow from sections and subterranean „ponds“ that were previously unconnected, forming new pathways and discharge points in the mine system.

The occurrence of groundwater flooding is usually very local and unlike flooding from rivers and the sea, does not generally pose a significant risk to life due to the slow rate at which the water level rises. However, groundwater flooding can persist for a long period and cause significant damage to property, especial in urban areas, if not considered in development planning. In most cases groundwater flooding cannot easily be eliminated although the impact on buildings can be mitigated to some extent through various measures.

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<sup>14</sup> Environment Agency (2007) *Making Space for Water: Groundwater Flooding Records Collation, Monitoring and Risk Assessment* (Reference HA5)



## A.4 Flooding from Drainage System

Flooding from artificial drainage systems occurs when flow entering a system, such as an urban storm water drainage system, exceeds its discharge capacity, it becomes blocked or it cannot discharge due to a high water level in the receiving watercourse;

Foul sewers and surface water drainage systems are spread extensively across the urban areas with various interconnected systems discharging to treatment works and into local watercourses.

Typically foul systems will comprise a network of drainage sewers, sometimes with linked areas of separate and combined drainage, all discharging to sewage treatment works. Combined Sewer Overflows (CSOs) provide an overflow release from the drainage system into local watercourses or surface water systems during times of high flows.

Surface water systems will typically collect surface water drainage separately from the foul sewerage and discharge directly into watercourse.

A major cause of sewer flooding is often due to the connection of surface water drains to discharge into the combined sewer systems. Sewer capacity can then become an issue in large rainfall events causing the backing up of flood waters internally within properties or discharging through manholes.

Insufficient capacity can also become an issue where urban areas develop over time, with improved sewerage infrastructure provision not always provided to accommodate the additional flows.

English and Welsh water companies are required to maintain a register of flooding incidences due to hydraulic capacity problems on the sewage network. This database identifies properties where flooding has occurred on a frequency of 1 in 5 years and 1 in 10 years. The database is known as DG5 and DG10 registers. A register for 1 in 20 years is also recorded which includes properties under investigation.

Whilst this data can give an idea of those areas with limited drainage capacity, it must be acknowledged that it is a register of properties that have flooded due to the hydraulic inadequacies of the sewer systems, not properties at risk of flooding. Therefore it has limiting usefulness in predicting future flooding.

Data generated using hydraulic network models such as InfoWorks or Win-Des (i.e. Microdrainage) potentially provide a very useful tool with which to predict more widespread potential for sewer flooding, and the use of such tools should be investigated during a Surface Water Management Plan.

## A.5 Flooding from Reservoirs and other Artificial Sources

Reservoirs can be a major source of flood risk, as experienced during the 2007 summer floods, where 18 reservoirs were affected across England. Whilst the probability of dam failure or breaching occurring is very small, the consequences of such an event can be devastating thereby presenting a risk of flooding which has to be considered.

Flooding from reservoirs is noted within the Pitt Review Recommendations and was acknowledged by Hilary Benn, the Secretary of State for Environment, Food and Rural Affairs. £1million has been pledged to improve reservoir safety specifically to produce inundation mapping for all reservoirs falling under the Reservoirs Act (i.e. those with a capacity of over 25,000 cu metres).

Reservoirs are classified on a consequence of failure basis outlined below in Table A- and it is now suggested that a better risk-based approach to reservoir safety is needed, focusing on those reservoirs that pose the greatest risk to the public, even if they are not currently covered by the Act.

Table A-1 Reservoir Consequence Classification	
Dam Category	Potential Consequence of Reservoir Failure
A	At least 10 lives at risk and extensive property damage
B	Fewer than 10 lives at risk or extensive property damage
C	Negligible risk to human life but some property damage
D	Negligible risk to human life and very limited property damage

The Environment Agency is currently producing simplified inundation maps for all reservoirs under the Reservoirs Act as required by Recommendation 57 of the Pitt Review. Trial projects have been run in the North West to develop the specification for these maps and will be producing maps for all reservoirs under the Act during 2009.

Currently the Water Act 2003, which amended the Reservoirs Act 1975, requires all reservoir undertakers to prepare Flood Plans for those reservoirs where the dam failure could put people's lives at risk or lead to major damage. These plans are expected to become a legal requirement in 2010.

The reservoir Flood Plans will include:

- An inundation analysis to identify the extent and severity of flooding which could result from an uncontrolled release of water (i.e. breaching or failure).
- An on-site plan setting out what the undertaker would do in an emergency to try to contain and limit the effects of the incident, and
- A communications plan with external organisations, mainly the emergency services.

Defra is currently funding a project to produce a „Guide to Emergency Planning for UK Reservoirs”, which will ultimately use the Flood Plans.

Until the new Water and Floods Bill is implemented it is unclear how reservoir safety, flood risk from breach and planning will be dealt with. In the meantime any allocations or applications for development immediately downstream of a reservoir should be considered carefully in liaison with the Environment Agency. It should be noted that the hazard is well managed through legislation and it is unlikely that the impact zone downstream of a reservoir would be a reason to stop permitted development. It is likely that the flood risk would be mitigated through emergency planning.

### Defences Failure

The condition of existing flood defences is an important consideration for local authority planners when allocating new development. PPS25 considers that defended areas (i.e. those areas that are protected to some degree against flooding by the presence of a

formalised flood defence) are still at risk of flooding, and therefore sites within these areas must be assessed with respect to the adequacy of the defences.

The condition of existing defences is provided in the form of a „rating“ (1 to 5), and is a reflection of any signs of „obvious“ structural problems. The condition rating is determined on the basis of visual inspection, focussing on obvious signs of structural defect (e.g. slippage, cracking, poor maintenance), designed to inform the maintenance programme. A summary of the NFCDD condition rating allocations is shown in Table A-2 below.

Table A-2 NFCDD Condition Ratings for Flood Defences		
Condition Rating	Condition	Condition Description
1	Very Good	Fully serviceable.
2	Good	Minor defects.
3	Fair	Some cause for concern. Requires careful monitoring.
4	Poor	Structurally unsound now or in the future.
5	Very Poor	Completely failed and derelict.

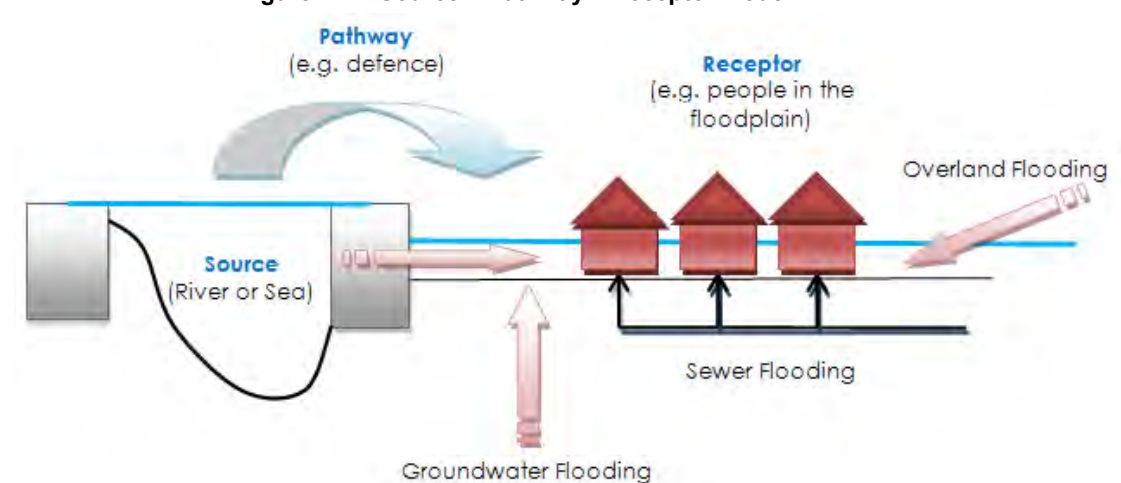
The condition of existing flood defences and whether they will continue to be maintained and/or improved in the future, is an issue that needs to be considered as part of the risk based sequential approach and in the light of this, whether proposed land allocations are appropriate and sustainable. In addition, detailed FRAs will need to explore the condition of defences thoroughly, especially where these defences are informal and contain a wide variation of condition grades.

If the condition of defences are low they are open to failure or if they are not provided the required standard of protection could potentially be overtopped during lower probability events. Flood risk associated with defence infrastructure is residual; however, the risks can be significant due to their sudden onset and velocities reached by flood waters.

## A.6 Flooding Likelihood and Consequence

Flood risk is generally accepted to be a combination of the likelihood of flooding and the potential consequences arising. It is assessed using the source – pathway – receptor model as shown in A-2 below. This is a standard environmental risk model common to many hazards and should be starting point of any flood-risk assessment. However, it should be remembered that flood risk can occur from many different sources and pathways and not just those shown in the simple form below.

**Figure A-2: Source – Pathway – Receptor Model**



The principal sources are rainfall or higher than normal sea levels, the principal pathways are rivers, drains, sewers, overland flow and river and coastal floodplains and their defence assets and the receptors can include people, their property and the environment. All three elements must be present for flood risk to arise. Mitigation measures have little or no effect on sources of flooding but they can block or impede pathways or remove receptors.

The planning process is primarily concerned with the location of receptors, taking appropriate account of potential sources and pathways that might put those receptors at risk.

It is important to define the components of flood risk in order to apply this guidance in a consistent manner. Flood risk is a combination of the likelihood of flooding and the potential consequences arising.

### Likelihood

Likelihood of flooding is normally expressed as the percentage probability based on the average frequency measured or extrapolated from records over a large number of years. A 1% probability indicates the flood level that is expected to be exceeded on average once in 100 years, i.e. it has a 1 in 100 chance of occurring in any one year.

Considered over the lifetime of development, such an apparently low-frequency or rare flood has a significant probability of occurring. For example a 1% flood has a 22% (1 in 5) chance of occurring at least once in a 25-year period (the period of a typical residential mortgage) and a 53% (1 in 2) chance of occurring in a 75-year period (a typical human lifetime).

### Consequence

Consequences of flooding depend on the hazards caused by flooding (depth of water, speed of flow, rate of onset, duration, wave-action effects, water quality) and the vulnerability of receptors (type of development, nature, e.g. age-structure, of the population, presence and reliability of mitigation measures etc).

Flood risk is then normally expressed as = Probability of flooding x Consequences of flooding

# A.7 Flood Warning

The Environment Agency has the lead role in providing flood warning services in England and Wales. The aim of the flood warning service is to reduce risk to life, distress to people and damage to property caused by flooding by providing accurate, timely flood warnings to residents within the floodplain of rivers, estuaries and coasts; to the media and partner organisations.

It is crucial that people at risk receive appropriate flood warnings and take action to protect themselves and their property. Within the Environment Agency corporate plan “Creating a Better Place<sup>15</sup>” the Agency has highlighted three main targets:

- To have 80% of properties at risk in the floodplain in England and Wales receiving and appropriate flood warning service,
- 75% of people who live in flood risk areas take appropriate action by 2011
- To have major incident plans in place for high flood risk areas.

Currently the Environment Agency operates a flood warning service in specific locations known as “Flood Warning Areas” where “Flood Warning Codes” are assigned based on the overall impact of flooding within an area. These include:

Flood Watch		“flooding of low-lying land and roads is expected”
Flood Warning		“ flooding of homes and businesses is expected”
Severe Flood Warning		“severe flooding is expected”
All Clear		“all clear or receding floodwaters”

The flood warnings are used to reduce the overall impact of flooding of people and property by lowering the vulnerability of the receptor. This is done by providing a warning which can then be used to remove people at risk or to relocate valuable possession to higher levels.

<sup>15</sup> Environment Agency (2006) Creating a Better Place: Corporate Strategy 2006-2011

## A.8 Flooding Impacts on People Property and the Environment

Flood impacts maybe direct or indirect, immediate or long term and may affect households and communities, individuals as well as the environment, infrastructure and economy of an area.

### Flooding Impacts on People

Flooding has a wide range of social impacts which may be difficult to delineate as they are interconnected, cumulative and often not quantifiable.

In small urban or steep upland catchments which have a very rapid response to rainfall, or with flooding due to infrastructure failure, flood waters can rise very quickly and put life at risk. Even shallow water flowing at 2m/s can knock children and many adults off their feet and vehicles can be moved by water of 300mm depth. The risks rise if the flood water is carrying debris.

The impact on people as a result of the stress and trauma of being flooded, or even of being under the threat of flooding, can be immense. This also extends to whole communities. Long-term impacts can arise due to chronic illnesses and stress. Flood water contaminated by sewage or other pollutants (e.g. chemicals stored in garages or commercial properties) is particularly likely to cause such illnesses, either directly as a result of contact with the polluted flood water or indirectly as a result of sediments left behind.

The degree to which populations are at risk from flooding is therefore not solely dependent upon proximity to the source of the threat or the physical nature of the flooding. Social factors also play a significant role in determining risk. Although people may experience the same flood, in the same area, at the same time, their levels of suffering are likely to differ greatly as a result of basic social differences. These differences will affect vulnerability in a variety of ways including an individual or community's response to risk communication (flood warning) and physical and psychological recovery in the aftermath of a flood. How individuals and communities experience the impact will also vary depending on their awareness of the risk of flooding, preparedness for the flood event and the existence or lack of coping strategies.

### Flooding Impacts on Property

Flooding can cause severe property damage. Flood water is likely to damage internal finishes, contents, electrical and other services and possibly cause structural damage. The physical effects can have significant long-term impacts, with re-occupation sometimes not being possible for over a year. The costs of flooding are increasing, partly due to increasing amounts of electrical and other sophisticated equipment within developments.

The damage flooding can cause to businesses and infrastructure, such as transport or utilities like electricity and water supply, can have significant detrimental impacts on local and regional economies. The long term closure of businesses, for example, can lead to job losses and other economic impacts.

The vulnerability of buildings is important to understand in terms of their occupants and their type. For example, it is much more difficult to evacuate the old and ill from hospitals and care homes than people working in offices or industrial areas. Building types that need to be operational during- and post-flood, such as ambulance stations and emergency response centres are also vulnerable as if their services they provide are disrupted by flooding it will place the immediate community at greater risk.

Transport and strategic utilities infrastructure can be particularly vulnerable to flooding because interruption of their function can have widespread effects well beyond the area of flooding. For example, flooding of primary roads or railways can deny access to areas for the duration of the flooding, as well as causing damage to the road or railway. Flooding of water distribution infrastructure such as pumping stations or of electricity sub-stations can result in loss of water or power over large areas. This can magnify the impact of flooding beyond the

immediate community and reinforces why decisions to locate development in floodplain should be taken very carefully.

Placing new development or regenerating in flood risk areas has its additional short and long term costs. The need to build resistant and resilient properties could significantly increase overall costs of development, whilst ongoing maintenance and insurance increase future expenditure.

## **Flooding Impacts on the Environment**

Environmental impacts can be significant and include soil erosion, bank erosion, land sliding and damage to vegetation as well as the impacts on water quality, habitats and flora and fauna caused by bacteria and other pollutants carried by floodwater.

Flooding can have a beneficial role in natural habitats. Many wetland habitats are dependent on annual flooding for their sustainability and can contribute to the storing of flood waters to reduce flood risk elsewhere. It is important to recognise the value of maintenance or restoration of natural riparian zones such as grasslands which protect the soils from erosion and „natural“ meadows which can tolerate flood inundation. The use of Green Infrastructure throughout the river corridor can also play a vital role in enhancing the river environment as well as safeguarding land from future development, protecting people and buildings from flooding and reducing flood risk downstream.

A natural floodplain can help accommodate climate change and improve the quality of rivers and associated wetlands to help achieve „good status“ by 2015 under the Water Framework Directive. Meeting WFD objectives involves not only ecosystems, water quality, drought and flood impact considerations but also the physical characteristics and morphology of the river channel, floodplain and associated structures.



## B. Flood Risk Hierarchy

### B.1 Introduction

Current Government policy requires local authorities to demonstrate that due regard has been given to the issue of flood risk as part of the planning process. It also requires that flood risk is managed in an effective and sustainable manner and where new development is as an exception necessary in flood risk areas, the policy aim is to make it safe without increasing flood risk elsewhere and wherever possible reduce flood risk overall.

Within the hierarchy of regional, strategic and site-specific flood-risk assessment, a tiered approach ensures that the level of information available is appropriate to the scale and nature of the flood-risk issues and the location and type of development proposed, avoiding expensive studies and the development of mitigation measures where it is not necessary.

As stated in PPS25 the three main levels of assessment are:

- Regional Flood Risk Appraisal (RFRA) – a broad overview of flood risk issues across a region to influence spatial allocations for growth in housing and employment as well as to identify where flood risk management measures may be required at a regional level to support the proposed growth;
- Strategic Flood Risk Assessment (SFRA) – an assessment of all types of flood risk informing land use planning decisions. This will enable the LPA to apply the Sequential Test in PPS25 and allocate appropriate sites for development, whilst identifying opportunities for reducing flood risk; and
- Site Specific Flood Risk Assessment (FRA) – site or project specific flood risk assessment to consider all types of flood risk associated with the site and propose appropriate site management and mitigation measures to reduce flood risk to and from the site to an acceptable level.

Implementation of the sequential risk-based approach requires forward planning. The allocation of land will be made through the Harrogate District Sites and Policies DPD which is subject to consultation, Sustainability Appraisal, and Examination by the Secretary of State. This DPD will be informed by the SFRA and RFRA which are broad-brush assessments of the risk of flooding, to guide strategic planning decisions. They involve the collection and collation of data on flooding and flood-risk management to provide information at the appropriate level of detail to allow decision-makers to:

- Prepare appropriate policies for flood-risk management within RSSs and LDFs;
- Understand the scale, extent and nature of the flood risk at a community level and how that would alter in the event of a proposed development;
- Apply a risk-based, sequential approach, to the allocation of land for development and confirm for example the compatibility of the likelihood of flooding and flood risk vulnerability;
- Assess whether application of the Exception Test is required and if so whether or not it is likely to be passed;
- Inform the preparation of the Strategic Environmental Assessment of RSSs and LDFs;
- Translate national guidance into locally specific guidance, including for example the identification of areas of floodplain that should be safeguarded for flood management purposes
- Identify the level of detail required for site-specific flood-risk assessments in particular locations; and
- Determine the acceptability of flood risk in relation to emergency planning capability and how the existing and proposed community would respond to a flood event.

## **B.2 Humber Regional Flood Risk Appraisal**

This is produced by the Yorkshire and Humber Regional Assembly and is reviewed in Appendix D.

## C. Flood Risk Management

### C.1 Introduction

Opportunities should be taken to minimise flood risk at all stages of the planning process using the risk based sequential approach when allocating land for development.

**Mitigation measures should be seen as a last resort to address flood risk issues.**

Mitigation measures must be designed to provide an appropriate level of protection to a site for the lifetime of the development. At many sites it may be technically feasible to mitigate or manage flood risk. However, the potential impacts of mitigation measures on flood risk to the surrounding community may result in practical constraints to development with significant financial implications. There will always be a residual risk remaining that should be accounted for through effective emergency planning.

The minimum acceptable standard of protection against flooding for new property within flood risk areas is the 1 in 100 year flood event for fluvial flooding, with an allowance for climate change over the lifetime of the development.

### C.2 Strategic Approach

Mitigation measures should be considered on a strategic basis that avoids a piecemeal approach. This should advocate partnership between the LPA and the Environment Agency and integrate with wider Environment Agency flood risk management works and strategies (e.g. CFMPs and Flood Risk Management Strategies).

Taking a strategic approach requires all that are involved in flood risk management to consider:

- Avoiding of development in flood risk areas
- The sequential approach to site layout, substituting higher vulnerability development in lower flood risk areas and considering flooding from all sources
- Wherever possible, using open land or green infrastructure to reduce risk, provide compensatory flood storage (including an allowance for climate change) or serve a sustainable drainage function
- Adopting mitigation solutions that fit with the wider vision of the community in managing flood risk. In significant flood risk areas, developers should aim to reduce risk to the wider community
- Adopting SuDS
- Preparing emergency flood plans

### C.3 Potential Mitigation Measures

Table C-1 provides links to the evidence in the North West Yorkshire SFRA Volume II, to identify what development could be seen as appropriate in each flood risk zone and what mitigation measures could potentially be adopted to reduce the level of risk. As above, all mitigation measures should fit in with the wider strategic approach advocated for a community and ensure that there is no increase in flood risk to the surrounding community. The developer should liaise closely with the Environment Agency and Development Control as to what mitigation measures may be suitable.

## C.4 Mitigation Techniques

### Reducing Flood Risk through Site Layout and Design

Flood risk should be considered at an early stage in deciding the layout and design of a site. This provides an opportunity to reduce flood risk within the development.

The PPS25 Practice Guide states that a sequential, risk-based approach should be applied to locate more vulnerable land use to higher ground. More flood-compatible development (e.g. vehicular parking, recreational space) can be located in higher risk areas.

Waterside areas, or areas along known flow routes, can be used for recreation, amenity and environmental purposes, allowing the preservation of flow routes and flood storage, and at the same time providing valuable social and environmental benefits contributing to other sustainability objectives. Landscaping should ensure safe access to higher ground from these areas, and avoid the creation of isolated islands as water levels rise.

The Environment Agency will have to consent to any works within 5 metres of a main river. It is likely that they will object in principle to any development within these areas.

### Managing Surface Runoff

Surface runoff from developments can affect flood risk elsewhere. Discussion between developers, local authority drainage engineers, the Environment Agency and Yorkshire Water is required to determine appropriate discharge rates from a site. The first stage in the SuDS management train (described in Appendix G) is prevention of runoff and pollution using good site design and housekeeping measures<sup>16</sup>.

The Sustainable Drainage Systems (SuDS) Interim Code of Practice 8 recommends that

- *For Greenfield sites any increase in runoff after site development for a 100 year, 6 hour event should be disposed of by infiltration. If this is not possible (e.g. due to ground conditions) additional runoff should be less than 2 l/s/Ha.*

Additionally some LPAs in Yorkshire and elsewhere are recommending that on redeveloped (Brownfield) sites runoff should be reduced following development to allow for future increases in runoff due to climate change.

Table C-3: Runoff Recommendations for Development Sites		
	Brownfield Sites	Greenfield Sites
Harrogate BC	Minimum 30% reduction to existing peak flow rates (For up to a 1 in 100 year storm (including climate change) plus 20% for climate change.	1.2 l/s/Ha for flat land 2.4 l/s/Ha for hills 4.8 l/s/Ha for Dales plus an additional 20% for climate change for a 1 in 100 year return period.
Craven DC	Use standard recommended values - FRAs for developments are reviewed externally.	
Richmondshire DC	Consult with RDC for current recommendations.	

<sup>16</sup> National SuDS Working Group (2004): Interim Code of Practice for Sustainable Drainage Systems. ([www.ciria.org.uk/suds](http://www.ciria.org.uk/suds))

## Modification of Ground Levels

Changing ground levels to raise the land above the required flood level is a very effective way of reducing flood risk to the site in question.

However, in most areas of fluvial flood risk, conveyance or flood storage would be reduced by raising land above the floodplain, adversely impacting on flood risk downstream. Compensatory flood storage must be provided, and should be on a level for level, volume for volume basis on land that does not currently flood but is adjacent to the floodplain (in order for it to fill and drain). It should take account of climate change and seek to create a net benefit for flood risk. It should be in the vicinity of the site and within the red line of the planning application boundary or on other land within the control of the applicant (unless the site is strategically allocated).

Where the site is entirely within the floodplain it is not possible to provide compensatory storage at the maximum flood level and this will not be a viable mitigation option. Compensation schemes must be environmentally sound.

The need for compensatory storage (including an allowance for climate change) must be discussed at the earliest stage of planning as this will be a major constraint as this requirement may have significant implications for the yields achieved for individual sites due to the associated land take this may require.

## Raised Defences

Construction of raised floodwalls or embankments to protect new development is not a preferred option, as a residual risk of flooding will remain. Compensatory storage (taking account of climate change) must be provided where raised defences remove storage from the floodplain.

Temporary or demountable defences are not acceptable flood protection for a new development unless flood risk is residual only.

## Developer Contributions to Flood Defences

In some cases, it may be necessary for the developer to make a contribution to the improvement of flood defence provision that would benefit both the development in question and the local community.

## Building Design

The raising of floor levels within a development avoids damage occurring to the interior, furnishings and electrics in times of flood. If it has been agreed with the Environment Agency that, in a particular instance, the raising of floor levels is acceptable, they should be raised to 600mm above the maximum water level during a 1 in 100 year flood event plus climate change. This additional height that the floor level is raised is referred to as the „freeboard“.

Making the ground floor use of a building water compatible (for example a garage), is an effective way of raising living space above flood levels.

Putting a building on stilts is not considered an acceptable means of flood mitigation for new development. However it may be allowed in special circumstances if it replaces an existing solid building, as it can improve flood flow routes. In these cases attention should always be paid to safe access and egress and legal protection should be given to ensure the ground floor use is not changed.

## Resistance and Resilience

There may be instances where flood risk remains to a development. For example, where the use is water compatible, where an existing building is being changed, where residual risk remains behind defences, or where floor levels have been raised but there is still a risk in a 1 in 1000 year event. In these cases (and for existing development in the floodplain), additional measures can be put in place to reduce damage in a flood and increase the speed of recovery. These measures should not be relied on as the only mitigation method.

The 2007 document „Improving the Flood Performance of New Buildings“ provides further details on possible resistance and resilience measures<sup>17</sup>.

**Temporary Barriers** consist of moveable flood defences which can be fitted into doorways and/or windows. The permanent fixings required to install these temporary defences should be discrete and keep architectural impact to a minimum. On a smaller scale temporary snap-on covers for airbricks and air vents can also be fitted to prevent the entrance of flood water.

**Permanent barriers** can include built up doorsteps, rendered brick walls and toughened glass barriers.

**Wet-proofing** involves designing interiors to reduce damage caused by flooding, for example:

- Electrical circuitry installed at a higher level with power cables being carried down from the ceiling rather than up from the floor level
- Water-resistant materials for floors, walls and fixtures

Resilience measures will be specific to the nature of flood risk, and as such will be informed and determined by the FRA.

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<sup>17</sup> Communities and Local Government (2007) *Improving the Flood Performance of New Buildings – Flood Resilient Construction*

## C.5 Making Development Safe

### Safe Entry and Exit

The developer must ensure that safe entry and exit is provided to an appropriate level for the type of development. This may involve raising access routes to a suitable level.

As part of the FRA, the developer should review the acceptability of the proposed access in consultation with the Environment Agency.

For the purpose of the SFRA it is considered appropriate to provide a low hazard environment in access and egress routes associated with new housing developments. Environment Agency guidance suggests that all development should have a dry access and egress in the 1 in 100 year event.

Greater depth and velocity may be permitted where elevated and safe access / egress to safe ground are provided although this will depend on the expected duration of flooding.

### Flood Warning and Evacuation

Emergency/evacuation plans should be in place for all properties, large and small, at residual risk of flooding; those developments which house vulnerable people (i.e. care homes and schools) should be avoided if possible. PPS 25 identifies these as 'more vulnerable' uses which require the exception test to be passed for development in Floodzone 3a.

More information on flood plans for development is provided in Section 6 of this User Guide.

## C.6 Making Space for Water

### Opportunities for River Restoration and Enhancement

All new development close to rivers should consider the opportunity presented to improve and enhance the river environment. Developments should look at opportunities for river restoration and enhancement as part of the development. Options include backwater creation, de-silting, in-channel habitat enhancement and removal of structures. When designed properly, such measures can have benefits such as reducing the costs of maintaining hard engineering structures, reducing flood risk, improving water quality and increasing biodiversity. Social benefits are also gained by increasing green space and access to the river.

### Opportunities for Floodplain Restoration

It is an objective of PPS25 to safeguard land from development that may be required for current or future flood management. In areas of very high flood risk there may be a strong case for allowing previously developed sites to return to Functional Floodplain in urban areas where they can act to convey and store flood water and reduce risk to current development.

### Buffer Strips

Developers should set back development from the landward toe of fluvial defences (or top of bank where defences do not exist) and this distance should be agreed with the Environment Agency. This provides a buffer strip to „make space for water“, allow additional capacity to accommodate climate change and ensure access to defences is maintained for maintenance. This may be carried out by the landowner, the Environment Agency or the Local Authority depending on local circumstances.



Table C-4: Possible Mitigation Measures					
Flood Source	SFRA Data Source	Risk Zone	Appropriate Development <sup>1</sup>	Comments	Possible Mitigation
Fluvial Depths & Hazards	NW Yorkshire SFRA Volume II Maps B (C1 to C6, H1 to H46, R1 to R23) & Maps C (C1 to C6, H1 to H46, R1 to R23)	Flood Zone 1	EI, WC, HV, MV & LV	All development is viable within Flood Zone 1; however other sources of flooding should be investigated.	None required for fluvial but may be for other sources
		Flood Zone 2, <0.3m depths or Very Low Hazard	EI, WC, HV, MV & LV	Low depth and hazards can be manageable with minor mitigation required	Sequential approach to site layout.
		Flood Zone 2, >0.3 depths, or Dangerous for some	EI, WC, MV & LV	All development must be designed to remain safe up to the 1 in 100 + climate change event, however residual risks must be considered if the development is situated behind defences.	Sequential approach to site layout. Raising floor levels may be a possibility. Additional measures can be put in place to reduce damage to existing properties and increase the speed of recovery (i.e. temporary and permanent barriers and wet-proofing). These measures should not be relied on as the only mitigation method. Emergency planning must be considered and safe access and egress routes should be identified.
		Flood Zone 3, 0.3–1m depths Or Dangerous for some	EI, WC, MV & LV	Sustainable mitigation and flood risk management may be feasible for both housing and employment purposes. There is a greater likelihood of passing the Exception Test. Areas may still have residual risks	Sequential approach to site layout. Raising floor levels is acceptable and they should be raised to 600mm above the maximum water level during a 1 in 100 year flood event plus climate change. Compensatory flood storage must be provided, and should be on a level for level, volume for volume basis and include an allowance for climate change. Emergency planning must be considered and safe access and egress routes should be identified.
		Flood Zone 3, 1–1.5m depths Or Dangerous for most	EI, WC & LV	Mitigation is likely to be costly and may not be technically feasible and economically justifiable for low value land uses. Housing allocations are not suitable. The likelihood of passing the Exception Test is lower.	Floor level raising for employment purposes is unlikely to be economically viable and employment allocations should be reconsidered in favour of alternative lower risk sites. Emergency planning must be considered and safe access and egress routes should be identified. Opportunities for floodplain and river restoration and/or buffer strips should be investigated.
		Flood Zone 3, >1.5m	None	Flood risk mitigation measures are unlikely to be technically feasible or economically	Large mitigation schemes would be required including raised defences. However, this is not a

Table C-4: Possible Mitigation Measures					
Flood Source	SFRA Data Source	Risk Zone	Appropriate Development <sup>1</sup>	Comments	Possible Mitigation
		depths or Dangerous for all		justifiable and all development should be avoided. Development is unlikely to be sustainable and the likelihood of passing the Exception Test is low.	preferred option, as a residual risk of flooding will remain. Compensatory storage must be provided where raised defences remove storage from the floodplain and should include an allowance for climate change. Emergency planning must be considered and safe access and egress routes should be identified. Opportunities for floodplain and river restoration and/or buffer strips should be investigated.
Surface Water	NW Yorkshire SFRA Volume II Detailed Surface Water Maps	High, Medium & Low	EI, WC, HV, MV & LV	Although surface water flooding will not directly impact on the spatial allocation of development, it should be considered within site layout. Surface water will also need to be controlled on site.	Opportunities should be sought to open up land where surface water is expected to flow or pool. SuDS should also be adopted to reduce risk on site and to the surrounding community by first storing water and managing run-off rates. The additional guidance for developing in CDAs should be considered if appropriate.
Canals	Level 2 SFRA information	Direct and Indirect	EI, WC, HV, MV & LV	Flood risk from canals is residual. Although this will not directly impact on the spatial planning of development, it should influence building design and finished flood levels.	The risk of canals should be mitigated through increasing the freeboard of proposed development finished floor levels. If a breach occurs there will be a sudden increase in water level. If a development is situated directly adjacent to a canal, flood warning would not be beneficial as breaching would be sudden. However, raising the awareness of the risk is critical.
Reservoirs	Level 2 SFRA information	Inundation Zone	EI, WC, HV, MV & LV	Flood risk from reservoirs is residual. Although this is unlikely to directly impact on the spatial planning of development, it should influence emergency planning associated with the reservoir. Smaller reservoirs could potentially pose the greatest risk.	The risk should be considered within the emergency planning of large sites if downstream of a larger raised reservoir. Smaller reservoirs should be assessed to identify the risk and appropriate mitigation put in place.
<sup>1</sup> EI = Essential Infrastructure, WC = Water Compatible, HV = Highly Vulnerable, MV = More Vulnerable, LV = Less Vulnerable Check with Table D.3 of PPS25 to see if Exception Test is required.					

## D. Planning Framework

### D.1 Introduction

The purpose of this section of the report is to identify and outline those high level documents which have been taken into account in preparing this SFRA, from a national to local level.

The land use planning process is driven by a whole host of policy guidance on a national, regional and local level. Whilst the majority of these policies are not aimed at mitigating flood risk, there are key links at strategic, tactical and operational levels between land use and spatial planning (Regional and Local Government), and Flood Risk Management (FRM) planning (Environment Agency), which should be considered as part of a planned and integrated approach to delivering sustainable development.

The sustainability appraisal will help draw together these links and balance the application of wider social, economic and environmental planning policy and guidance. Flood risk assessment is required at all levels of the planning process and for all major developments in flood risk areas; these play an increasingly important role in assisting effective delivery of key planning objectives.

### D.2 Flood Risk Management Drivers

The principal FRM policy drivers are brought together in the Government's recently released draft Flood and Water Management Bill and it is an important part of the Government's response to Sir Michael Pitt's Report on the summer 2007 floods. It also gives effect to a number of commitments in the Government's "Future Water" strategy document. In addition, the draft Bill responds to a number of climate change challenges including, more frequent extreme weather events causing a greater risk of flooding and drought, increased population, increased water demand and more water quality problems. It provides the Environment Agency with a strategic overview role for flood risk in England and Wales and gives local authorities in England a clear leadership role in local flood risk management encompassing all sources of flooding. An improved integrated and risk based approach is proposed to the future management of flood risks, and this requires other concerns such as sustainability, biodiversity and the whole water cycle to be taken into account by local authorities and other relevant organisations.

A core policy thread running through all current policy drivers is the fundamental shift in emphasis from building defences to prevent flooding, to one of managing flood risk by using a suite of measures. All operating authorities are required to invest in the provision of sustainable flood risk management and this includes LPAs adopting a flood risk management hierarchy of assessing, avoiding, substituting, controlling and mitigating flood risk through the land use planning system. They should have regard to flooding from all sources (particularly surface water and not just from rivers and the sea). Government does however; recognise that in some circumstances, appropriate mitigation measures may still involve new, or improving and maintaining existing flood defences where justified, to protect increasingly vulnerable communities.

Current key policy related documents provide LPAs with important and valuable knowledge on the strategic direction of flood risk management and assist their strategic land use planning decision making for re-generation, inward investment and growth etc.

Key documents currently influencing FRM policy are:

- EU Floods Directive – (2007)
- Draft Floods and Water Management Bill – Defra (2009)
- Future Water (2008)
- Improving Surface Water Drainage – Defra (2008)
- Making Space for Water – Defra (2005)

- Planning Policy 25: Development & Flood Risk - (2006)
- Planning Policy 25: Development & Flood Risk Practice Guide - (2008)
- Learning Lessons from the 2007 Floods – Sir Michael Pitt (2008)
- Catchment Flood Management Plans
- Shoreline Management Plans

## EU Floods Directive

The “EU Floods Directive” aims to reduce and manage the risk floods pose to human health, the environment, cultural heritage and economic activity. Member States have two years in which to transpose its provisions into domestic legislation and the first requirements of the Directive begin at the end of 2011. By this date, an evidence base for flood risk should be developed to map the risk and then produce plans to manage it. Preliminary Flood Risk Assessments (PFRAs) for all sources of flooding need to be prepared showing the impact of historic flooding and the potential impact of a repeat event. Following this, areas of potentially Significant Flood Risk (SFR) need to be defined. In addition, and by the end of 2013, flood hazard and flood risk maps for the SFR areas are required and be co-ordinated with, and possibly integrated into, the reviews of River Basin Districts under the Water Framework Directive (WFD). Finally, by the end of 2015, Flood Risk Management Plans (FRMPs) must be established to aim to reduce the potential adverse consequences of flooding and/or reduce its likelihood.

- Dec 2011 Preliminary Flood Risk Assessment (PFRA) (Review by Dec 2017 then 6 yearly intervals)
- Dec 2013 Mapping Elements (Review by Dec 2019 then 6 yearly intervals)
- Dec 2015 Surface Water Management Plans (SWMP) (Review by Dec 2021 then 6 yearly intervals)

The Government propose to use existing flood risk planning outputs of RFRAs and SFRAs to deliver the requirements of PFRAs. It is also proposed that local authorities extend their Level 2 SFRAs to look at the impact of flooding on the environment and cultural heritage when determining SFR areas. In addition, it is proposed that SWMPs will be FRMPs under the Directive, and will also be a tool more generally for local flood risk management. This integrated approach will underpin the planning system and guide the location of future development to avoid and minimise flood risk, whilst also meeting the requirements of the Floods Directive. Local authorities, through their land use planning activities, have a key role to play.

## Draft Floods and Water Management Bill

The “Draft Floods and Water Management Bill” proposes new unifying legislation covering all forms of flooding and shifting the emphasis from building defences to managing risk. It aims to:

- Reduce the likelihood and impacts of flooding;
- Improve the ability to manage the risk of flooding, by clarifying who is responsible for what;
- Reduce pollution and improve water quality;
- Give water companies better powers to conserve water during drought;
- Reduce red tape and other burdens on water and sewerage companies; and
- Improve the overall efficiency of the industry.

A number of proposals in the draft Bill have particular implications for local authorities, land use planning and related flood risk. These include:

- The Environment Agency will be given a strategic overview role covering all forms of flooding and will coordinate maps and plans in relation to the sea, main rivers and reservoirs; it will also be given the same powers as Councils to carry out coastal erosion works and may be a statutory consultee in respect of future coastal erosion planning applications;
- Local authorities will have an enhanced leadership role in local flood risk management which includes ensuring that flood risk from all sources, including from surface run-off, groundwater and ordinary watercourses, is identified, taken account of in the spatial planning process and managed as part of locally agreed work programmes;
- Local authorities will develop a suite of measures for managing local flood risk, for example, surface water mapping, appropriate development planning and collating information on flood risk and drainage assets;
- County and unitary authorities will be responsible for local flood risk assessment and lead in ensuring the production of SFRAs and SWMPs;
- SFRAs will provide the evidence to allow LPAs to factor flood risk into their LDFs, DPDs and individual planning proposals, and help to determine where SWMPs are needed;
- Level 2 SFRAs in areas of significant risk would directly inform EU Floods Directive flood risk maps and also inform the production of local FRMPs, such as SWMPs;
- SWMPs will have a stronger role in coordinating development and investment planning;
- County and unitary authorities will lead new local partnerships and have responsibility for adopting and maintaining sustainable drainage systems (SuDS) in new development, where they affect more than one property;
- The automatic right to connect surface water drains and sewers to the public sewerage system will be ended and developers will be required to put SuDS in place in new developments wherever practicable;
- Surface water connection to public sewers will be conditional on meeting new national standards on SuDS and drainage, and the approval of a SuDS approving body will be needed, and a certificate issued, before development can begin;
- Increased emphasis is needed on enabling flood water to safely flow overland with green infrastructure and safe flow routes being identified as part of flood risk assessments;
- County or unitary authorities, the Environment Agency and IDBs will have powers to formally designate natural and man-made features (similar in principle to the Listed Buildings classification), which help to manage flood or coastal risk; they will give formal consent before anyone can change or remove the feature and use enforcement powers where needed; and
- All relevant authorities will have a duty to cooperate and share information.

The content and implications of the draft Bill provide considerable opportunities for improved and integrated land use planning and flood risk management by local authorities and other key partners. The integration and synergy of strategies and plans at national, regional and local scales, is increasingly important to protect vulnerable communities and deliver sustainable re-generation and growth.

Key dates for implementing the Draft Floods and Water Management Bill include:

1. June 2011 Preliminary Flood Risk Assessment (PFRA)
2. June 2013 Mapping Flood Risk & Hazards
3. June 2015 Flood Risk Management Plans

## Improving Surface Water Drainage

The “Improving Surface Water Drainage” consultation document was produced in support of the Government’s water strategy and in line with Sir Michael Pitt’s initial conclusions. Many of the proposals identified have been carried forward into the new draft Flood and Water Management Bill. The consultation considers policy measures to improve the way surface water runoff is managed. In particular, it proposes:

- a. Issuing SWMPs as a tool to improve co-ordination between stakeholders involved in drainage and local management of flood risk;
- b. Increasing uptake of SuDS by clarifying responsibilities for adoption and management; and
- c. Reviewing the ability for premises to connect surface water drainage automatically into the public sewer system.

Current roles and responsibilities were considered along with various options for improving the current surface water drainage situation. In particular the document recognises that SFRAs and SWMPs already form part of the PPS25 planning framework and there is an aim to enhance their role and make stronger links between surface water drainage and strategic planning.

## Making Space for Water Strategy

The “Making Space for Water Strategy” is a milestone document that confirms the Government’s strategic direction for Flood and Coastal Erosion Risk Management (FCERM). Over the 20-year lifetime of the new strategy, Government will implement a more holistic approach to managing flood and coastal erosion risks in England. The approach will involve taking account of all sources of flooding, embedding flood and coastal risk management across a range of Government policies, and reflecting other relevant Government policies in the policies and operations of operating authorities for flood and coastal erosion risk management.

The 2004 consultation document “Making Space for Water” sets out the following vision:

*“...we want to make space for water so that we can manage the adverse human and economic consequences of flooding and coastal erosion while achieving environmental and social benefits in line with wider government objectives.”*

In other words, the aim of the strategy is to balance the three pillars of sustainability, managing flood risk and ensuring that the social and economic benefits which accrue from growth and development are attained. This balanced approach, integrating sustainable development with responsible risk management, has underpinned this SFRA.

Section 7 of the consultation document deals with measures to reduce flood risk through land-use planning, which emphasises the Government’s commitment to ensuring that the planning system aims to reduce flood risk wherever possible and, in any event, should not add to it. However, it is acknowledged that 10% of England is already within mapped areas of flood risk and that contained within these areas are some of the Brownfield sites which other areas of Government policy has identified as a priority for future housing provision. The document asserts that over the past five years, 11% of new houses were built in flood-risk areas. The document identifies three sets of measures which may be undertaken to manage flood risk when development is sited in such areas:

- Protection measures to provide, at minimum, the standards of protection specified in PPS25;
- Provision of features such as sacrificial areas and compartmentalisation to reduce the consequences of a flood event should one occur (such as functional floodplain); and
- Use of construction techniques that increase the flood resistance and resilience of buildings.



The document proposes that RSSs and LDFs should take full account of flood risk and incorporate the sequential approach in PPS25. Moreover, the document encourages integration with other planning systems, in particular Catchment Flood Management Plans. Use of European Union (EU) funding streams, such as Interreg IIIB is recommended where applicable, to enable Local Authorities to undertake trans-national projects aimed at advancing knowledge and good practice in flood risk management.

## Making Space for Water: Programme of Work

The “Making Space for Water: Programme of Work” was developed following consultation and takes account of any relevant recommendations that emerged from the Pitt Review into the 2007 floods that affected many parts of England.

One of Defra’s and CLG’s early outputs from the Making Space for Water Programme was the publication, of PPS25 in December 2006. This work, together with the Practice Guide forms the Governments required approach to managing and reducing flood risk through the land use planning system.

A valuable piece of work looking at “Developing a Broader Portfolio of Options to Deliver Flooding and Coastal Solutions” has been carried out as part of this programme and is very useful to local authorities and other operating authorities, in their strategic planning of flood risk management. Outputs from this work are available from Defra.

Quarterly update reports are released providing details of progress made and key achievements. These reports can be accessed via the Making Space for Water website at <http://www.defra.gov.uk/enviro/fcd/policy/strategy.htm>.

## The Pitt Review

The “Pitt Review” has been carried out following the severe floods of summer 2007 and is a key document for local authorities in their consideration of flood risk management. Sir Michael Pitt was asked by Ministers to conduct an independent review of events and report on the lessons that should be learned. In December 2007 an Interim Report was published by the Review team. The Review collected evidence by visiting affected areas and examining over 600 written statements submitted by victims of the floods. The report presents a schedule of interim conclusions, many of which relate to local authorities. These interim conclusions shaped the National approach to flood management and can be accessed via the Defra website.

Pitt’s final report was released in June 2008 and contains detailed findings, conclusions and 92 recommendations for action, covering all aspects of strategic and local flood risk management. These interim conclusions are intended to shape the National approach to flood management and can be accessed via the Defra website. Some of the recommendations which are relevant to this SFRA and the role of local authorities” in future local flood risk management include;

- Recommendation 11 – Building Regulations should be revised to ensure that all new or refurbished development in high flood risk areas is flood resistant or resilient.
- Recommendation 14 – Local Authorities should lead on the management of local flood risk, with support of the relevant organisations.
- Recommendation 15 – Local Authorities should positively tackle local problems of flooding working with all relevant parties, establishing ownership and legal responsibility.
- Recommendation 16 – Local Authorities should collate and map the main flood risk management and drainage assets (over and underground), including a record of their ownership and condition.
- Recommendation 17 – All relevant organisations should have a duty to share information and cooperate with local authorities and the Environment Agency to facilitate the management of flood risk.



- Recommendation 18 – Local Surface Water Management Plans, as set out under PPS25 and coordinated by local authorities, should provide the basis for managing all local flood risk.
- Recommendation 19 – Local Authorities should assess and, if appropriate, enhance their technical capabilities to deliver a wide range of responsibilities in relation to local flood risk management.
- Recommendation 20 – The Government should resolve the issue of which organisations should be responsible for the ownership and maintenance of sustainable drainage systems.
- Recommendation 52 – In the short term, the Government and infrastructure operators should work together to build a level of resilience in critical infrastructure assets that ensures continuity during worst case flood event.
- Recommendation 57 – The Government should provide Local Resilience Forums with the inundation maps for both large and small reservoirs to enable them to assess risks and plan for contingency, warning and evacuation.

Pitt's findings, conclusions and recommendations for action are challenging but will be extremely important in guiding local authorities and other operating authorities in their consideration of future flood risk management activities, including land use planning. They have also been a key driver in shaping the content of the draft Flood and Water Management Bill.

## D.3 National Planning Policy

This SFRA has been prepared in a period during which planning authorities have been implementing the provisions of the Planning and Compulsory Purchase Act 2004 and accompanying planning guidance, including PPS1 Delivering Sustainable Development and PPS12 Local Development Frameworks. This affected all tiers of the planning system and has necessitated major changes at both the regional and local level which will impact on the way in which planned development is approached in the regional strategy and delivered locally.

### PPS25 Development and Flood Risk

In December 2006 the Government published PPS25: Development and Flood Risk.

The aim of PPS25 is to ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding and to direct development away from areas at highest risk. The key planning objectives are that "Regional Planning Bodies (RPBs) and Local Planning Authorities (LPAs) should prepare and implement planning strategies that help to deliver sustainable development by:

- Identifying land at risk and the degree of risk of flooding from river, sea and other sources in their areas;
- Preparing Regional or Strategic Flood Risk Assessments (RFRAs / SFRAs) as appropriate, as a freestanding assessment that contributes to the Sustainability Appraisal of their plans;
- Framing policies for the location of development which avoid flood risk to people and property where possible, and manage any residual risk, taking account of the impacts of climate change;
- Only permitting development in areas of flood risk when there are no suitable alternative sites in areas of lower flood risk and the benefits of the development outweigh the risks from flooding;
- Safeguarding land from development that is required for current and future flood management e.g. conveyance and storage of flood water, and flood defences;
- Reducing flood risk to and from new development through location, layout and design, incorporating sustainable drainage systems (SuDS);
- Using opportunities offered by new development to reduce the cause and impacts of flooding e.g. surface water management plans; making the most of the benefits of green infrastructure for flood storage, conveyance and SuDS; re-creating functional floodplain; and setting back defences;
- Working effectively with the Environment Agency, other operating authorities and other stakeholders to ensure that best use is made of their expertise and information so that plans are effective and decisions on planning applications can be delivered expeditiously; and
- Ensuring spatial planning supports flood risk management policies and plans, River Basin Management Plans and emergency planning."

In addition to setting out the roles and responsibilities for LPAs and RPBs, PPS25 identifies that landowners also have a primary responsibility for safeguarding their land and other property against natural hazards such as flooding. Those promoting sites for development are also responsible for:

- Demonstrating that the development is consistent with PPS25 and Local Development Documents (LDDs);
- Providing a Flood Risk Assessment (FRA) demonstrating whether the proposed development: is likely to be affected by current or future flooding; satisfies the LPA that the development is safe; and identifies management and mitigation measures.

PPS25 also introduces an amendment to Article 10 of The Town and Country Planning (General Development Order) 1995 which makes the Environment Agency a Statutory Consultee on all applications for development in flood risk areas, and those within 20m of a Main River.

The Direction also introduces the requirement for LPAs to notify the Secretary of State where they are minded to approve a planning application contrary to a sustained objection by the Environment Agency.

The introduction of PPS25 enables local authorities to make a direction under Article 4 of the Town and County Planning (General Permitted Development) Order 1995. This will enable Local Authorities to remove permitted development rights where those rights threaten to have a direct, significant and adverse effect on a flood risk area, or its flood defences and their access, or the permeability and management of surface water, or flood risk to occupants.

## PPS25 Development and Flood Risk Practice Guide

The Practice Guide to PPS25 was published by the Department for Communities and Local Government (CLG) in June 2008. It provides advice on the practical implementation of PPS25 policy and reflects extensive discussion with local authorities, the Environment Agency and other key stakeholders and practitioners. The guide provides further guidance on the preparation of SFRA's and FRA's, the Sequential and Exception Test, outlines potential mitigation measures e.g. SuDS and risk management techniques.

Local Authority planners and developers are advised to refer to and use PPS25 and the practice guide in conjunction with the further advice contained within this report.

## Other Planning Policy Statements

PPS1 Delivering Sustainable Development published in February 2005 sets out the overarching planning policies for the delivery of sustainable development across the planning system and sets the tone for other planning policy statements. PPS1 explicitly states that development plan policies should take account of flooding, including flood risk. It proposes that new development in areas at risk from flooding should be avoided. Planning authorities are also advised to ensure that developments are "sustainable, durable and adaptable" including taking into account natural hazards such as flooding.

PPS1 also places an emphasis on „spatial planning“ in contrast to the more rigid „land use planning“ approach which it supersedes. Planning authorities will still produce site specific allocations and a proposals map as LDDs, but their Core Strategy will be more strategic and visionary in content and will take into account the desirability of achieving integrated and mixed use development and will consider a broader range of community needs than in the past. With regard to flood risk, it will be important for the Core Strategies and accompanying Supplementary Planning Documents to recognise the contribution that non-structural measures can make to flood management.

Planning Policy Statement: Planning and Climate Change, a supplement to PPS1, published in December 2007, sets out how the Government expects the planning system to address climate change. It explains that there is a compelling scientific consensus that human activity is changing the world's climate. The evidence that climate change is happening, and that man-made emissions are its main cause, is strong. The Intergovernmental Panel on Climate Change highlights that we are already experiencing the effects of climate change and if these changes deepen and intensify, as they are predicted to do without the right responses locally and globally, we will see even more extreme impacts.

One of the predicted impacts of climate change is more intense periods of rainfall and consequent flooding. The PPS1 supplement requires Regional Spatial Strategies and Local Development Frameworks to shape sustainable communities that are resilient to such effects. A key objective of the planning system being to secure new development and shape places

that minimise vulnerability and provide resilience to climate change in ways that are consistent with social cohesion and inclusion. Accordingly new development should be planned to minimise future vulnerability in a changing climate. The SFRA incorporating Sequential and Exception Test information is essential in meeting the objectives of the PPS1 supplement Planning and Climate Change.

Whilst not directly relevant to the development of an SFRA, it is important to recognise that the exercise takes place within the context of other planning policy guidance and statements, some of which also require sequential testing of site allocations and development proposals. PPS3 (Housing), emerging PPS4 (Planning for Sustainable Economic Development) and PPS6 (Planning for Town Centres) are intrinsic within the planning process and, therefore, an understanding of the constraints faced as a result of this additional policy guidance is required.

## D.4 Regional Policy Drivers

### Regional Spatial Strategy

The statutory Regional Spatial Strategy (RSS) for the Yorkshire and Humber was published in May 2008<sup>18</sup> following consultation on the draft plan in January 2006 and an examination in public by an independent panel in autumn 2006. This replaced the previous strategy which was published in 2004 and outlines the current adopted planning strategy for the period to 2026.

The RSS links development, flood risk and flood risk management in a number of its policies. Policy YH1 (Overall approach and key spatial priorities) states (B8) that:

"Plans, strategies, investment decisions and programmes should aim to avoid increasing flood risk, and manage land and river catchments for flood mitigation, renewable energy generation, biodiversity enhancement and increased tree cover"

The RSS identifies increase in flood risk as a consequence of climate change (policies YH2, ENV1) and recognises that land use and management can have a key role to play in managing flood risk including:

- Green Infrastructure (policy YH8)
- Forestry, Trees and Woodland (policy ENV6)
- Agriculture (policy ENV7)
- Biodiversity and integrity of the natural environment (policy ENV8)

Policy ENV1 focuses on Development and Flood Risk stating that:

*"A The Region will manage flood risk pro-actively by reducing the causes of flooding to existing and future development, especially in tidal areas, and avoid development in high flood risk areas where possible.*

*B Allocation of areas for development will follow a sequential approach and will be in the lowest risk sites appropriate for the development (identified by Strategic Flood Risk Assessments).*

*C Flood management will be required to:*

*. . .*

*3. Provide flood storage, habitat creation and managed realignment in areas around the Humber, and other river corridors as required*

*4. Provide positive land management for flood alleviation, particularly in the upland areas of the Yorkshire Dales, the North York Moors, the Howardian Hills and the Pennines."*

The RSS divides the Yorkshire and Humber Region into a number of sub areas and policies relevant to the North West Yorkshire SFRA study state that investment in infrastructure in the Leeds City Region (includes the southern parts of Craven and Harrogate) will be targeted (amongst other priorities) to manage flood risk (policies LCR1 and LCR2). In the Vales and Tees area (which includes Ripon area and part of Richmondshire) policy VTL1 states that "Plans, strategies, investment decisions and programmes for the Vales and Tees Links sub area should: . . .Reduce the risk of flooding in settlements adjacent to the sub areas rivers and control development in "at risk" areas" (C3 Environment). The RSS recognises that in the Remoter Rural sub area (policy RR1)

*"Plans, strategies, investment decisions and programmes for the Remoter Rural Sub Area should:*

<sup>18</sup> Government Office for Yorkshire and the Humber (2008), The Yorkshire and Humber Plan, Regional Spatial Strategy to 2026.

*...Encourage appropriate planting and management measures in the sub area to ameliorate downstream flood risk and enhance biodiversity*

*...Collaborate with neighbouring regions and authorities across upland water catchment areas to manage rainfall run-off to minimise downstream flooding"*

These policies provide the regional planning framework within which local decisions are made.

## River Basin Management Plan

In accordance with the Water Framework Directive (WFD), implemented in December 2000, a River Basin Management Plan (RBMP) must be produced for each of the 11 River Basin Districts by 2009. The Environment Agency state that:

*"RBMPs will have a number of functions, but are primarily intended:*

- To establish a strategic plan for the long term management of the River Basin District.
- To set out objectives for waterbodies and in broad terms what measures are planned to meet these objectives
- Act as the main reporting mechanism to the European Commission"

Most of the North West Yorkshire SFRA area is covered by the Humber RBMP19 the western part of Craven DC is in the headwaters of the River Ribble and River Lune which are part of the North West RBMP20. Following consultation final plans are due to be published in December 2009.

## Humber Regional Flood Risk Appraisal

JBA Consulting was commissioned by the Yorkshire and Humber Regional Assembly to undertake a scoping study for the RFRA<sup>21</sup>. The scoping study examines the Strategic Flood Risk Assessments undertaken across the Yorkshire and Humber region, and considers how these could form the basis for a more strategic flood risk appraisal. By using the sub-areas defined in the RSS, the study provides a more holistic view of flood risk, and therefore planning implications at a sub-area level.

The appraisal is displayed through maps which have been structured:

- Regionally through economic indicators,
- At city regions via a range of flood risk indicators presented at Growth Point Level; and
- At Growth Areas using a broad range of combined flood risk indicators.

The scoping report and associated maps can be found on Yorkshire and Humber Regional Assembly website.

The primary objective of a Regional Flood Risk Appraisal (RFRA) is to provide an appraisal of strategically significant flood risk issues in a region in order to guide strategic planning decisions.

<sup>19</sup> Environment Agency, 2009. Water for Life and Livelihoods, A Consultation on the Draft River Basin Management Plan, Humber River Basin District. <http://wfdconsultation.environment-agency.gov.uk/wfdcms/en/humber/Intro.aspx>

<sup>20</sup> Environment Agency, 2009. Water for Life and Livelihoods, A Consultation on the Draft River Basin Management Plan, North West River Basin District. <http://wfdconsultation.environment-agency.gov.uk/wfdcms/en/northwest/Intro.aspx>

<sup>21</sup> Yorkshire and Humber Regional Assembly, June 2008. Yorkshire and Humber Regional Assembly, Regional Flood Risk Appraisal Scoping Study, JBA Consulting.

The RFRA assists decisions on key land use factors such as need for employment, inward investment, re-generation, provision of housing and open/green space, major road and other infrastructure development provision to deliver sustainable growth whilst taking full account of flood risks, now and in the future. The appraisal also drives and informs policy development and setting in the Regional Spatial Strategy (RSS) for the strategic management of flood risk, and in turn assists local authority planners in their consideration and implementation of land use policies in Local Development Frameworks (LDFs) and Local Development Documents (LDDs). In addition, it provides important strategic flood risk input to the Regional Sustainability Appraisal (RSA) and the Strategic Environmental Assessment (SEA).

The outputs of the RFRA help to identify where there may be a need for further flood risk assessment work to be undertaken, particularly in respect of Strategic Flood Risk Assessments (SFRAs) and where strategically significant developments are proposed in areas currently at risk of flooding. Even where SFRAs already exist, the RFRA helps to place specific local authority flood risks into a regional context, showing the variation of risk and the interdependency between neighbouring authorities and river sub-catchments. Flooding does not respect local authority administrative boundaries and the RFRA provides a mechanism to help local authorities work better together, and with key stakeholders, to consider, communicate and share common or similar flood risk management policy objectives, opportunities and constraints.

## Climate Change Action Plan for the North East

The Yorkshire and Humber Climate Change Partnership have published the Climate Change Plan for Yorkshire and Humber which sets a strategic direction for managing and combating climate change in the Yorkshire and Humber Region between 2009 and 2014<sup>22</sup>. The Yorkshire and Humber Climate Change plan identifies what is needed to be done to tackle climate change in North East England. It shows how all sectors have the opportunity to actively engage with this work, take direct action and influence how the plan is developed.

The Yorkshire and Humber Assembly have produced "Weathering the Storm - Yorkshire and Humber Regional Adaptation Strategy" which investigates impacts for a number of sectors and proposes adaption measures to help improve regional resilience. This summarises key climate change impacts and adaptations for local authorities including Harrogate, Craven and Richmondshire<sup>23</sup>. These are based on UKCIP 2002 scenarios.

Climate change impacts continue to provide an increasing challenge to sustainable flood risk management for government and operating authorities. The severe flooding experienced across the country in recent years and in particular during the summer 2007 were, in the words of Sir Michael Pitt, "a wake up call".

Flood risk related climate change issues are extremely important to the future management of flood risk in the UK and beyond. These issues need to be taken seriously and mitigation and adaptation measures planned and adopted by Regional and Local Authorities.

Principle adverse flood risk effects of climate change threatening people and property include:

- More frequent and intense rainfall events causing flash flooding to low lying areas;
- More and faster surface water runoff and overland flows causing sewers, drains, rivers and streams to overflow;
- Increased sea level rise, storminess and frequency of storm surges threatening low lying coastal communities; and
- Rising groundwater levels causing increased spring source activity and higher spring flows increasing the risk of flooding.

<sup>22</sup> Yorkshire and Humber Climate Change Partnership. Climate Change Plan for Yorkshire and Humber (2009 - 2014). <http://www.yourclimate.org/>

<sup>23</sup> Yorkshire and Humber Assembly. Weathering the Storm - Yorkshire and Humber Regional Adaption Study. Local Area Reports available for Craven, Harrogate and Richmondshire districts (<http://www.adaptyh.co.uk/>)



If not addressed, these effects are likely to have a significant impact on many communities and in particular new developments in areas at high risk of flooding. Recent climate change trends are contained within a UK Climate Impacts Programme document: The Climate of the United Kingdom and Recent Trends published in December 2007 and is available on their website. Updated climate projections have recently been published (UKCP09)<sup>24</sup>

In recognition of the Governments increasing concerns about the effects of climate change on flood risk management, Defra produced a "Supplementary Note to Operating Authorities – Climate Change Impacts" in October 2006 in which they updated the climate change policy for flood and coastal management. This document is available on the Defra website. In conjunction with Defra, CLG then provided the recommended climate change contingency allowances for sea level rise and precautionary sensitivity ranges for peak rainfall intensities and peak river flows etc. in Annex B of PPS25. These figures should be used in all aspects of flood risk management including the consideration of new developments and changes of land use in flood risk areas.

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<sup>24</sup> <http://ukcp09.defra.gov.uk/>

## D.5 Local Planning Policy

Following the introduction of the Planning and Compulsory Purchase Act 2004, the way in which development plans are prepared is changing. With the aim of speeding up and simplifying plan preparation and improving community involvement, development plans in their current form are to be abolished and replaced with a new development plan system, the Local Development Framework (LDF).

### Local Plans

Local Plans identified particular major sites with development opportunities, principal shopping centres, employment zones and other uses and sets out the policies that the Council applies in deciding whether or not development will be permitted.

Harrogate Local Plan was adopted in 2001 and a Selective Alteration was made in 2004. Craven Local Plan was adopted in July 1999 and Richmondshire in September 2001. Some policies from the Local Plans have been retained or "saved" and are being superseded by policies in the new Local Development Framework. Saved UDP policies are now subject to a formal direction by the Secretary of State. Local Council websites planning policy pages summarise the current policies (<http://Harrogate.gov.uk>, <http://cravendc.gov.uk> and <http://richmondshire.gov.uk>) and provide an up to date source of information during the transition to the Local Development Frameworks.

### The Emerging Local Development Framework

The Local Plans are currently in the process of being replaced by the Local Development Framework (LDF). The LDF will take the form of a portfolio of plans and documents. The Local Authorities have a statutory duty to produce:

- Local Development Scheme (LDS) which sets out a schedule of Development Plan Documents and public consultation opportunities.
- Statement of Community Involvement (SCI) which sets out how communities, organisations and individuals can become involved with producing and revising planning documents.
- Annual Monitoring Report (AMR) which sets out the council's progress in producing development documents and implementing policies.

The authorities also produce Development Plan Documents (DPDs) which are subject to an independent examination and an inspectors report. These can include:

- Core Strategy DPD which describes the vision for the district and the policies for strategic development and conservation.
- Sites and Policies DPD which expands on the areas in the core strategy.

Supplementary Planning Documents (SPDs) are produced by the local authorities and link to the DPDs to providing more detailed guidance. These may cover a range of subjects for example housing, provision of open space or village halls. The LDF may also include Area Action Plans (AAPs) which focus on an area subject to significant change (e.g. Richmond and Catterick Garrison AAP) and conservation area appraisals (e.g. Craven have produced appraisals for Skipton, Settle and Giggleswick conservation areas).

The LDF is supported by an evidence base of background studies investigating housing and employment needs, a Strategic Housing Land Availability Assessment (SHLAA), a Strategic Housing Market Assessment (SHMA) and other studies including this SFRA.

Sustainability Appraisal (SA) is required for some of these documents. The SA identifies the environmental, social and economic effects of a plan and ensures that sustainable development principles are followed.

Further details of the current LDF documents available for Richmondshire, Craven and Harrogate are summarised on their websites including details of their current status.

### **Harrogate Borough Local Development Framework - Development Patterns**

Harrogate Borough Council LDF Core Strategy was adopted in February 2009. The strategic vision for the area identifies Harrogate and Knaresborough as the main areas for development of market and affordable housing, retail, business and sporting facilities. Continued regeneration of Ripon is proposed including housing on underused or vacant land, local services and tourism. In Boroughbridge development of affordable homes for local people is proposed along with provision of employment land. Its role as a service centre for surrounding areas is also important. Pateley Bridge and Masham provide local services, in these areas there will be some provision of homes and necessary community facilities. In villages and the countryside there will be some provision of affordable homes in settlements with existing services and facilities. The rural economy and character are also to be maintained.

### **Craven District Council Local Development Framework - Development Patterns**

Craven District Council LDF Core Strategy is currently consulting on the preferred options. In the Craven area Skipton has been identified as the principal service centre and should accommodate much of the development in the district. Local service centres (Settle and Giggleswick, Glusburn/ Crosshills with Sutton in Craven and High Bentham) will have a central role in the development of services in the area. In smaller local service centres (Gargrave and Ingleton) limited development will be supported along with maintaining existing facilities. In smaller villages development will be restricted to meet local needs and in the smallest villages and open countryside development will be very restricted.

### **Richmondshire District Council Local Development Framework - Development Patterns**

Richmondshire District Council is currently developing its LDF Core Strategy. This will focus on Richmond and the Garrison Area for principal town functions in the area. A large proportion of future development is likely to take place in the Garrison area. The council is supportive of the plans for military related development at the Catterick Garrison main site. The important role of Leyburn as a local service centre for communities in the Lower Wensleydale area will be supported. Development outside of the main towns will be appropriate to the scale of the smaller settlements. The rural and built characters of the district are important assets for quality of life and the local economy. Our overall strategy will seek to maintain and where possible enhance these assets.

## D.6 Environment Agency Policy

### Catchment Flood Management Plans

CFMPs are high level policy documents establishing a policy framework for flood risk management across a catchment. These investigate factors which influence flood risk at the catchment scale and assess the impacts that climate change, land use change and urbanisation may have on flood risk over the next 50 to 100 years.

The CFMPs help to prioritise activities, focus resources where there is greatest need, and determine what flood risk management responses need to be considered further (and which responses will not be effective). The responses to flood risk will be broader than those traditionally used for flood defence to reflect the full range of management options available. CFMPs support an integrated approach to spatial planning and river basin management, in line with the Water Framework Directive and the EU Directive on the assessment and management of flood risk; they cover all geographical areas in England and Wales and are crucial in the planning of sustainable flood risk management.

Recognition of these strategic plans is very important to local authority planners when planning for the future and considering long term land use options for re-generation, inward investment and growth.

The North West Yorkshire SFRA area is covered by 3 catchment flood management plans (CFMPs). The NE CFMPs are not currently available as they are in draft form and due for consultation in 2010. Once they are finalised full details of all CFMPs will be available on the Environment Agency website

### Ribble CFMP

The River Ribble CFMP (Upper Ribble and Hodder sub area) covers part of the Craven area including Hellifield, Giggleswick and Settle. The policy for this area is for no active intervention as overall risk is low. Key messages identify opportunities for flood storage.

### Lune CFMP

The Lune CFMP covers the western part of the Craven area. The Wenning sub area identifies High Bentham and Clapham as being at risk of flooding and key messages are that strong development control is required in the area. The policy is to reduce flood risk.

The Rural Lune sub area identifies the village of Ingleton and nearby campsites to be at risk of flooding. The policy is to sustain the current level of flood risk into the future. Key messages from the CFMP are promotion of natural functioning of the river and protection from development for the floodplain.

### NE Region CFMPs

The following CFMPs cover parts of the NW Yorkshire SFRA area:

- Tees CFMP
- Aire CFMP
- Ouse CFMP

## D.7 Summary

In accommodating future development in North West Yorkshire, there is a range of planning policies to consider and balance on a national, regional and local level. Future development needs have been broadly specified in regional plans and are being refined on a local level in the emerging LDF.

PPS25 and its Practice Guide provides the overarching national guidance with respect to development and flood risk, emphasising the need to effectively manage flood risk within the planning system, rather than relying on reactive solutions to flooding. This includes a responsibility for LPAs to reduce flood risk to people and property as a result of new development. It also identifies the preparation of SFRA as a key process in the understanding and management of flood risk for planning purposes.

It is widely recognised that flood risk is one of a whole raft of policy constraints placed upon the local planning system. Development must facilitate the socio-economic needs of a community, and spatially must sit within an existing framework of landscape and infrastructure. For this reason, a balance must be sought between development need and the risk it may pose upon existing and future residents of the area as a result of flooding.

The aim of this SFRA is to provide a better understanding of flood risk in North West Yorkshire that can feed into the emerging LDF and enable informed and balanced planning decisions to be made.

## E. Stakeholder Engagement and Data Management

### E.1 Introduction

Most data provided in both the North West Yorkshire Volume 1 and II has been obtained through consultation with those stakeholders with specific interest in or knowledge of sources of flooding within the study area.

PPS25 outlines a number of key consultees to the planning process. Stakeholders and their involvement within the preparation of the North West Yorkshire SFRA are discussed in Table D1.

**Table E-1: Stakeholder Involvement**

Stakeholder	Involvement
LPA	<p>Harrogate, Craven and Richmondshire Councils were the main stakeholder for the preparation of this SFRA. They focused the scope of the SFRA and provided the detail needed for its production.</p> <p>An initial SFRA meeting was held with Harrogate BC and the EA to discuss the requirements of PPS25 in producing a Level 1 SFRA and to determine the main tasks that needed to be completed. The meeting also outlined the councils' own timetable relating to preparing an evidence base for their LDF process.</p> <p>There have been regular progress updates outlining progress to date and further data requests.</p>
Environment Agency	<p>The Environment Agency is a statutory consultee for RSSs, LDDs, Sustainability Appraisals and Strategic Environmental Assessments. They are also a statutory consultee for planning applications.</p> <p>With regards to the North West Yorkshire SFRA, the Environment Agency has discretionary powers under the Water Resources Act (1991) to manage flood risk and, as a result, hold the majority of flood risk data in the UK. Separate departments were consulted via the External Relations Team including Development Control, Flood Risk Mapping and Data Management and Reservoir Safety Teams on the SFRA approach and available data.</p> <p>The Environment Agency was also one of the main consultees throughout the preparation of the SFRA and their comments and guidance have been included in the report.</p>
Yorkshire Water	<p>Yorkshire Water provided relevant information from their DG5 register.</p> <p>Harrogate, Richmond and Craven Councils should continue to liaise with Yorkshire Water in conjunction with the Environment Agency to explore how they can contribute to the understanding of flood risk now or in the future.</p>
North Yorkshire County Council	<p>NYCC provided have been contacted requesting information about highway flooding in the SFRA area. Additional information will be added to the Final Level 1 SFRA report.</p>
North Yorkshire Fire and Rescue Service	<p>The NYFRS provided a spreadsheet of data outlining over 4000 incidents between July 1997 and March 2009. These were geo referenced and mapped at a strategic scale with other historical data. These represent incidents where the Fire and Rescue Services were called out such as pumping out of flooded property and roads.</p>

### E.2 SFRA Data Management

The North West Yorkshire SFRA should be viewed as a „living“ document for use in the day-to-day process of planning and development. It is therefore important that datasets collected for the SFRA are transparent and accessible. A Data Register has been produced and supplied to the individual Councils listing all data received throughout the SFRA process.

All data was reviewed on receipt and its quality and confidence rated for use in the SFRA. This process was purely based on professional judgement and rated on a high to low scale.

Most data requested was of the quality and accuracy expected. Most of the datasets could be mapped geographically using Geographic Information Systems (GIS), helping to visualise the risk of flooding, others were not however, reducing the quality score. Historical flooding

information was generally marked as both medium quality and confidence, as whilst it could be placed on a map, there was generally information on the source of flooding. The confidence in its precision was also questionable, as expected for historical flood records.

The Data Register will allow intended users of the SFRA to review the accuracy, currency and relevance of all datasets used and for a central group to manage and update datasets when needed. The Data Register also provides details of contacts who supplied the data. The organisations listed should be the first contact for any update to the SFRA to make sure the most up-to-date datasets are used.

### **E.3 Supplying SFRA Data**

Whilst all data collected and produced during the North West Yorkshire SFRA process has been supplied to each LPA (report, maps, GIS, modelled output) there should be controls on its use. It is anticipated that the SFRA report (all volumes) and associated maps will be published on each Council website as PDFs as the central source of SFRA data and available to download.

Each LPA will be able to use the modelled output (depths, hazards and outlines) for internal use. This use of this information must consider the context within which it was produced. The use of this data will fall under the license agreement between the LPA and the Environment Agency as it has been produced using Environment Agency data. It should be remembered that the modelling undertaken for the SFRA is of a strategic nature and more detailed FRAs should seek to refine the understanding of flood risk from all sources to any particular site.

SFRA data should not be passed on to third parties outside of the LPA. Any third party wishing to use existing Environment Agency flood risk datasets should contact External Relations in the Environment Agency North West Region. A charge is likely to apply for the use of this data.



## F. Flood Risk Zones

### Zone 1: Low Probability

#### Definition

This zone comprises land assessed as having a less than 1 in 1000 annual probability of river and sea flooding in any year (<0.1%).

#### Appropriate uses

All uses of land are appropriate in this zone

#### FRA requirements

For development proposals on sites comprising one hectare or above the vulnerability to flooding from other sources as well as from river and sea flooding, and the potential to increase flood risk elsewhere through the addition of hard surfaces and the effect of the new development on surface water run-off, should be incorporated in an FRA [Flood Risk Assessment]. This need only be brief unless the factors above or other local considerations require particular attention. See Annex E (of PPS25) for minimum requirements

#### Policy aims

In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area and beyond through the layout and form of the development and the appropriate application of sustainable drainage techniques.

### Zone 2: Medium Probability

#### Definition

This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% – 0.1%) and between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% – 0.1%) in any year.

#### Appropriate uses

The water-compatible, less vulnerable and more vulnerable uses of land and essential infrastructure listed in... [The Flood Risk Vulnerability Classification, see Table A-2] are appropriate in this zone.

Subject to the Sequential Test being applied, the highly vulnerable uses in Table D.2 (of PPS25 and Table B-2 of this report) are only appropriate in this zone if the Exception Test is passed

#### FRA requirements.

All development proposals in this zone should be accompanied by a FRA. See Annex E (of PPS25) for minimum requirements

#### Policy Aims

In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage techniques.

### Zone 3a: High Probability

#### Definition

This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) and a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.

#### Appropriate uses

The water-compatible and less vulnerable uses of land listed in Table D.2 (of PPS25 and Table A-2 of this report) are appropriate in this zone.

The highly vulnerable uses listed in Table D.2 (of PPS25 and Table A-2 of this report) should not be permitted in this zone.

The more vulnerable and essential infrastructure listed in the Table D.2 (of PPS25 and Table B-2 of this report) should only be permitted in this zone if the Exception Test is passed. Essential Infrastructure permitted in this zone should be designed and constructed to remain operational and safe for user in times of flood.

#### **FRA requirements**

All development proposals in this zone should be accompanied by a FRA, See Annex E (of PPS25) for minimum requirements.

#### **Policy Aims**

In this zone, developers and local authorities should seek opportunities to:  
 reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage techniques;  
 relocate existing development to land in lower Flood Zones; and  
 Create space for flooding to occur by restoring functional floodplain and flood flow pathways and by identifying, allocation and safeguarding open space for flood storage.

### **Zone 3b: The Functional Floodplain**

#### **Definition**

This zone comprises land where water has to flow or be stored in times of flood. SFRAs should identify this Flood Zone (land which 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, or at another probability to be agreed between the LPA and the Environment Agency, including water conveyance routes).

#### **Appropriate uses**

Only the water-compatible uses and the essential infrastructure listed in Table D.2 that has to be there should be permitted in this zone. It should be designate 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.

Essential infrastructure in this zone should pass the Exception test.

#### **FRA requirements**

All development proposed in this zone should be accompanied by a FRA. See Annex E for minimum requirements.

#### **Policy Aims**

In this zone, developers and local authorities should seek opportunities to:  
 Reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage techniques; and  
 Relocate existing development to land with a lower probability of flooding.

## G. Flood Vulnerability Classification

Table G-1 Flood Vulnerability Classification	
Classification	Description
Essential Infrastructure	<ul style="list-style-type: none"> <li>Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk and strategic utility infrastructure, including electricity generating power stations and grid and primary substations.</li> </ul>
Highly Vulnerable	<ul style="list-style-type: none"> <li>Police stations, Ambulance stations, Fire stations, Command Centres, and telecommunications installations required to be operational during flooding.</li> <li>Emergency dispersal points.</li> <li>Basement dwellings.</li> <li>Caravans, mobile homes and park homes intended for permanent residential use.</li> <li>Installations requiring hazardous substances consent (1)</li> </ul>
More Vulnerable	<ul style="list-style-type: none"> <li>Hospitals.</li> <li>Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels.</li> <li>Buildings used for: dwelling houses; student halls of residence; drinking establishments; nightclubs; and hotels.</li> <li>Non-residential uses for health services, nurseries and educational establishments.</li> <li>Landfill and sites used for waste management facilities for hazardous waste. (2)</li> <li>Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan</li> </ul>
Less Vulnerable	<ul style="list-style-type: none"> <li>Buildings used for: shops; financial, professional and other services; restaurants and cafes; hot food takeaways; offices; general industry; storage and distribution; non-residential institutions not included in „more vulnerable“; and assembly and leisure.</li> <li>Land and buildings used for agriculture and forestry.</li> <li>Waste treatment (except landfill and hazardous waste facilities).</li> <li>Minerals working and processing (except for sand and gravel working).</li> <li>Water treatment plants.</li> <li>Sewage treatment plants (if adequate pollution control measures are in place).</li> </ul>
Water-compatible Development	<ul style="list-style-type: none"> <li>Flood control infrastructure.</li> <li>Water transmission infrastructure and pumping stations.</li> <li>Sewage transmission infrastructure and pumping stations.</li> <li>Sand and gravel workings.</li> <li>Docks, marinas and wharves.</li> <li>Navigation facilities.</li> <li>MOD defence installations.</li> <li>Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location.</li> <li>Water-based recreation (excluding sleeping accommodation).</li> <li>Lifeguard and coastguard stations.</li> </ul>

Table G-1 Flood Vulnerability Classification	
Classification	Description
	<ul style="list-style-type: none"> <li>• Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.</li> <li>• Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.</li> </ul>
<p>Note 1: This classification is based on advice from the Environment Agency on the flood risks to people and the need of some uses to keep functioning during flooding.</p> <p>Note 2: Buildings that combine a mixture of uses should be placed into the higher of the relevant classes of flood risk sensitivity. Developments that allow uses to be distributed over the site may fall within several classes of flood sensitivity.</p> <p>(1)DETA Circular 04/00 – para. 18: Planning controls for hazardous substances.</p> <p>(2)See Planning for Sustainable Waste Management: Companion Guide to Planning Policy Statement 10 for definition.</p>	

## H. Sustainable Drainage Systems (SuDS)

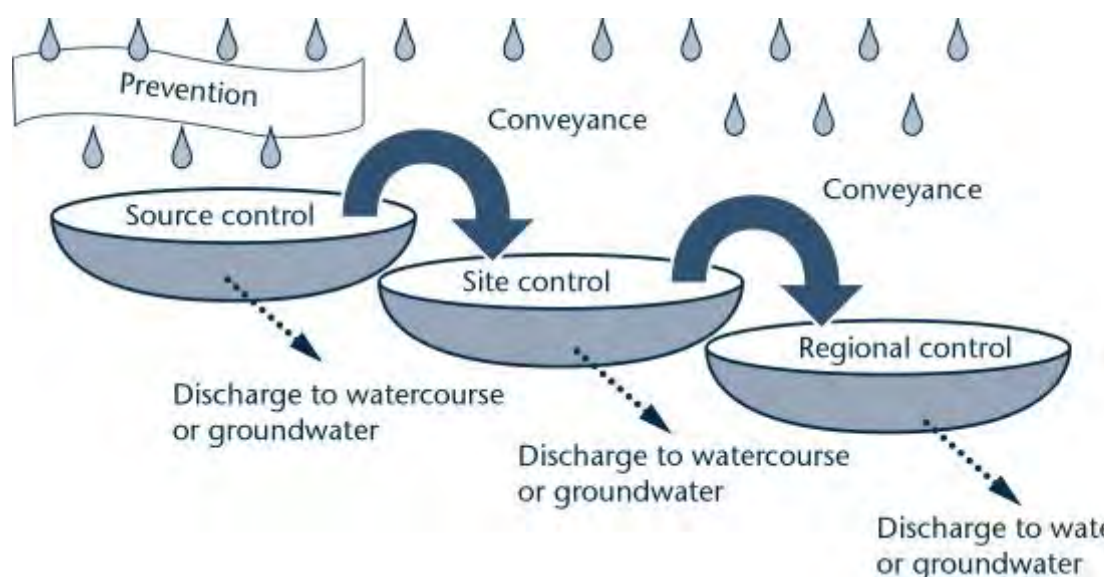
### H.1 Sustainable Drainage Systems

Sustainable Drainage Systems (SuDS) are management practices which enable surface water to be drained in a more sustainable manner.

For Greenfield developments, the aim is to not increase runoff from the undeveloped situation; for Brownfield re-developments, the aim is to reduce existing runoff rates. Wherever possible, this should be achieved through the implementation of a sustainable drainage or flow retention system, constructed within the boundaries of the development site.

There are many different SuDS techniques which can be implemented. As a result, there is no one correct drainage solution for a site. In most cases, a combination of techniques, using the Management Train principle, will be required. Figure G1 shows the SuDS Management Train principle. This is a hierarchy of techniques starting with the need to prevent runoff and pollution using good site design, this is followed by source control (where runoff is controlled at or very near its source - examples include green roofs, soakaways and permeable paving for individual properties), the next stage is site control where runoff is managed at a site scale (e.g. routing runoff to a single soakaway or infiltration basin for the whole site). Finally regional control is the management of several sites often using a detention pond or wetland<sup>25</sup>.

**Figure G1: SuDS Management Train Principle<sup>26</sup>**



Regarding flood risk, those SuDS with a high/primary process for dealing with water quantity should first be investigated, before other benefits such as water quality and environmental benefits are included. SuDS can reduce the amount and rate of runoff by a combination of:

- Infiltration;
- Storage; and
- Conveyance

<sup>25</sup> National SUDS Working Group (2004): Interim Code of Practice for Sustainable Drainage Systems. ([www.ciria.org.uk/suds](http://www.ciria.org.uk/suds))

<sup>26</sup> CIRIA (2008) Sustainable Drainage Systems: promoting good practice – a CIRIA initiative

There are a number of SuDS techniques which could be used individually or as part of a management train, however their suitability relies on the site and catchment descriptors discussed above but also their intended purpose (as shown in Table G1).

Table H-1 Suitability of SuDS Techniques			
SuDS Technique	Infiltration	Storage	Conveyance
Green Roofs	✗	✓	✓
Permeable Paving	✓	✗	✓
Rainwater Harvesting	✗	✓	✗
Swales	✓	✓	✓
Detention Basins	✓	✓	✓
Ponds	✗	✓	✓
Wetlands	✗	✓	✓
Source: PPS25 Practice Guide			

PPS25 stresses that Regional Planning Bodies and LPAs should:

- Promote the use of SuDS for the management of run-off.
- Ensure their policies and decisions on applications support and complement the Building Regulations on sustainable rainwater drainage, giving priority to infiltration over first watercourses then sewers.
- Incorporate favourable policies within Regional Spatial Strategies.
- adopt policies for incorporating SuDS requirements in Local Development Documents
- Encourage developers to utilise SuDS wherever practicable, if necessary through the use of appropriate planning conditions
- Develop joint strategies with sewerage undertakers and the Environment Agency to further encourage the use of SuDS.



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