

Wigan Borough Hybrid SFRA

Volume II: SFRA User Guide

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Purpose

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Executive Summary

Introduction

Wigan Council is required to undertake a Strategic Flood Risk Assessment (SFRA) as an essential part of the evidence-gathering stage of the Local Development Framework (LDF) and in the preparation of the Local Development Documents (LDDs). The SFRA provides baseline information for use in the preparation of the Sustainability Appraisal (SA).

The requirement for 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 lead role in local flood risk and development planning. SFRAs are required in order to demonstrate that sufficient consideration has been given to flood risk at all stages of the planning process and to avoid inappropriate development in higher risk areas.

Local authority planners need to demonstrate that a risk-based sequential approach to development planning and flood risk has been adopted throughout the evaluation process and applied during preparation of development plans. This is achieved through the application of the Sequential and Exception Test as outlined in PPS25.

The SFRA comprises relevant data, guidance and recommendations for flood risk issues at a local level. It is a planning tool that enables the Local Planning Authority (LPA) to carry out Sequential and Exceptions Testing and to select and develop sustainable site allocations at lower risk of flooding.

The SFRA provides an integrated approach to strategic and local Flood Risk Management (FRM). The SFRA also provides links to other policy documents such as Catchment Flood Management Plans (CFMPs), Regional Flood Risk Appraisals (RFRAs), Preliminary Flood Risk Appraisals (PFRAs) and Surface Water Management Plans (SWMPs).

The Wigan Level 2 Hybrid Strategic Flood Risk Assessment (SFRA) is presented as two reports.

- Volume I: Is the hybrid SFRA, including detailed assessment of actual and residual flood risk within high risk communities.
- Volume II: Is the accompanying SFRA User Guide.

SFRA User Guide

The User Guide provides specific guidance for the SFRA. This report should be used by all involved in the development planning process. This Guide is presented as five key chapters comprising:

- Guidance for Spatial Planners
- Guidance for Development Management
- Guidance for Developers
- Guidance for Flood Risk Management
- Guidance for Emergency Planners

Included as appendices is further background information and explanation of the SFRA process:

- a. **Flood Risk Concepts**
- b. **Flood Risk Assessment Hierarchy**
- c. **The Planning Framework**
- d. **Stakeholder Engagement and Data Management**
- e. **Flood Risk Zones**
- f. **Flood Risk Vulnerability Classification**
- g. **Sustainable Drainage Systems**
- h. **Flood Risk Mitigation**

SFRA Mapping

A suite of strategic flood risk maps have been produced for the SFRA. In keeping with PPS25 and the associated Practice Guide, these maps should be used to locate development away from areas at high risk of flooding.

Future development planning also needs to make reference to this suite of strategic flood risk maps, as well as any updated information provided by the LPA and Environment Agency.

Use of SFRA Data

Whilst all data used in the preparation of this SFRA has been supplied to the LPA (including, for example, reports, mapping, Geographic Information Systems (GIS) and modelled data) there is a need to maintain controls over the data and how it is applied and modified. It is anticipated that the SFRA and associated maps will be published on the Council's website as PDFs. As the central source of SFRA data, these maps will be available to download.

The LPA will be able to use the modelled output (depths, hazards, velocities and extent outlines) for internal use. The 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.

Contents

Executive Summary	3
Contents	5
1 Introduction	13
1.1 Background.....	13
1.2 SFRA Monitoring	15
2 Guidance for Spatial Planners	16
2.1 Introduction	16
2.2 Sequential Test.....	21
2.3 Exception Test.....	22
2.4 Applying the Sequential Test and assessing the likelihood of passing the Exception Test.....	24
2.5 Flood Risk and other Land Use Policies.....	26
3 Guidance for Development Management	28
3.1 Introduction	30
3.2 The Sequential Test and Exception Test.....	30
3.3 Supporting the FRA Process	31
4 Guidance for Developers	32
4.1 Introduction	32
4.2 The Sequential Test and Exception Test.....	33
4.3 Site specific Flood Risk Assessments	34
4.4 FRA Guidance	35
4.5 Critical Drainage Areas.....	37
4.6 Considering risk of flooding from other sources	37
4.7 Drainage for new developments.....	41
5 Guidance for Flood Risk Management	45
5.1 Introduction	45
5.2 Strategic Approach	45
5.3 Potential mitigation measures	45
6 Guidance for Emergency Planners	49
6.1 Introduction	49
6.2 Emergency planning overview.....	49
6.3 Flood Plan Recommendations	50
6.4 Planning Approval – Flood Plans including flood warning.....	51
6.5 Flood Awareness	52
Appendices	LIII
A. Flood Risk Concepts	LIII
B. Flood Risk Assessment Hierarchy	LXIV
C. The Planning Framework	LXVII
D. Stakeholder Engagement and Data Management	LXXXIX
E. Flood Risk Zones	XCI
F. Flood Risk Vulnerability Classification	XCVI
G. Sustainable Drainage Systems	C
H. Flood Risk Mitigation	CV

List of Figures

Figure 2-1: Taking flood risk into account in LDDs	18
Figure 2-2: Sequential & Exception Test Key Steps	19
Figure 2-3: Sequential Test and Exception Test Flow Diagram.....	20
Figure 2-4: (Where the Exceptions Test Applies).....	23
Figure 2-5: First and Second Pass of Proposed Development Sites Sequential Test.....	25
Figure 2-6: Identifying the Likelihood of Passing the Exception Test	26
Figure 3-1: Planning Applications and Flood Risk.....	29
Figure 4-1: FRA Preparation	35
Figure 4-2: Considering the risk of canal flooding in FRAs	38
Figure A-1: Flooding From All Sources.....	LIV
Figure A-2: (Source-Pathway-Receptor model).....	LX
Figure B-1: Hierarchical Approach to Flood Risk Assessments	LXV
Figure G-1: SUDS Management Train Principle ²¹	C

List of Tables

Table 1-1: Relevant Legislation, Plans, Policies and Strategies.....	14
Table 1-2: SFRA Review Triggers	15
Table 3-1: FRA considerations and SFRA supporting evidence	31
Table 4-1: Development types and application of Sequential and Exception Tests.....	33
Table 5-1: Possible Mitigation Measures	46
Table 6-1: Flood Warning and Evacuation Plans	51
Table A-1: Reservoir Consequence Classification	LVII
Table A-2: NFCDD Condition Ratings for Flood Defences	LVIII
Table A-3: Flood Hazard ratings.....	LXII
Table D-1: Stakeholder Involvement.....	LXXXIX
Table F-1: Land Use Classifications	XCIX
Table G-1: Suitability of SUDS Techniques	CI

Abbreviations

ABD	Areas Benefiting from Defences
AEP	Annual Exceedance Probability
AGMA	Association of Greater Manchester Authorities
CFMP	Catchment Flood Management Plans
CLG	Communities and Local Government
COW	Critical Ordinary Watercourses
CRR	Community Risk Register
CSO	Combined Sewer Overflow
DPDs	Development Plan Documents
DTM	Digital Terrain Model
EA	Environment Agency
ELA	Employment Land Availability
EU	European Union
FCERM	Flood and Coastal Erosion Risk Management
FRA	Flood Risk Assessment
FRM	Flood Risk Management
GMRF	Greater Manchester Resilience Forum
LDDs	Local Development Documents
LDF	Local Development Framework
LIDAR	Light Detection and Ranging
LPAs	Local Planning Authorities
NFCDD	National Fluvial and Coastal Defence Database
PPS	Planning Policy Statement
RFRA	Regional Flood Risk Assessment
RBMP	River Basin Management Plans
RPB	Regional Planning Bodies
RPG	Regional Planning Guidance
SA	Sustainability Appraisal
SCI	Statement of Community Involvement
SEA	Strategic Environmental Assessment
SFRA	Strategic Flood Risk Assessment
SHLAA	Strategic Housing Land Availability Assessment
SMP	Shoreline Management Plans
SoP	Standard of Protection
SUDS	Sustainable (Urban) Drainage Systems
SWMP	Surface Water Management Plan
UDP	Unitary Development Plan
UU	United Utilities
WCS	Water Cycle Study
WFD	Water Framework Directive

Glossary

Actual risk

The risk posed to development situated within a defended area (i.e. behind defences), is expressed in terms of the probability that the defence will be overtopped, and/or the probability that the defence will suffer structural failure and the consequences should the failure occur.

Annual exceedence probability

The estimated probability of a flood of given magnitude occurring or being exceeded in any year. Expressed as, for example, 1 in 100 chance or 1 per cent Annual Exceedence Probability (AEP).

Adoption of sewers

The transfer of responsibility for the maintenance of a system of sewers to a sewerage undertaker.

Attenuation

Reduction of peak flow and increased duration of a flow event usually by temporary storage of flood water

Catchment Flood Management Plans (CFMP)

A strategic planning tool through which the Environment Agency will seek to work with other key decision-makers within a river catchment to identify and agree policies for sustainable flood risk management.

Climate change

Long-term variations in global temperatures and weather patterns, both natural and as a result of human activity.

Compensation storage

A floodplain area introduced to compensate for the loss of storage as a result of land raising for development purposes.

Design event

A historic or notional flood event of a given annual flood probability, against which the suitability of a proposed development is assessed and mitigation measures, if any, are designed.

Design event exceedence

Flooding resulting from an event which exceeds the magnitude for which the defences protecting a development were designed (see residual risk).

Design flood level

The maximum estimated water level during the design event.

DG5 register

Register held by water companies on the location of properties at risk of flooding from public sewers

Exceedence flow

Excess flow that emerges on the surface once the conveyance capacity of a drainage system is exceeded.

Extreme Flood Outline

Flood 'zone' maps released by the Environment Agency in showing anticipated undefended 0.1% AEP flood extents in a consistent manner throughout the UK.

Flood defence

Flood defence infrastructure, such as flood walls and embankments, intended to protect an area against flooding to a specified standard of protection.

Flood Map

A map produced by the Environment Agency providing an indication of the likelihood of flooding within all areas of England and Wales, assuming there are no flood defences. Only covers river and sea flooding.

Floodplain

Area of land that borders a watercourse, an estuary or the sea, over which water flows in time of flood, or would flow but for the presence of flood defences where they exist.

Flood and Water Management Act

The Flood and Water Management Act¹ received Royal Assent on 8th April 2010. The Act creates unifying legislation covering all forms of flooding and shifting the emphasis from building defences to managing risk.

Flood Estimation Handbook (FEH)

Provides current methodologies for estimation of flood flows for the UK.

Flood Risk Management (FRM)

The introduction of mitigation measures (or options) to reduce the risk posed to property and life as a result of flooding. It is not just the construction of physical flood defences.

Flood risk management strategy

A long-term approach setting out the objectives and options for managing flood risk, taking into account a broad range of technical, social, environmental and economic issues.

Flood Risk Assessment (FRA)

A study to assess the risk to an area or site from flooding, now and in the future, and to assess the impact that any changes or development on the site will have on flood risk to the site and elsewhere. It may also identify, particularly at more local levels, how to manage those changes to ensure that flood risk is not increased. PPS25 differentiates between regional, sub-regional/strategic and site-specific flood risk assessments.

Flood risk management measure

Any measure which reduces flood risk such as flood defences.

Flood Risk Regulations

The Flood Risk Regulations transpose the EU Floods Directive into UK law and were introduced on 10 December 2009. These confirm the lead local flood authority role and require specific tasks to be undertaken by these authorities this year, with completion of Preliminary Flood Risk Assessments and identification of Flood Risk Areas due by June 2011.

Flood Zone

A geographic area within which the flood risk is in a particular range, as defined within PPS25.

¹ <http://www.defra.gov.uk/environment/flooding/policy/fwmb/key-docs.htm>

Fluvial

Flooding caused by overtopping of rivers or stream banks.

Freeboard

The difference between the flood defence level and the design flood level, which includes a safety margin for residual uncertainties.

Greenfield land

Land that has not been previously developed.

ISIS

ISIS is a software package used for 1-Dimensional river modelling. It is used as an analysis tool for flood risk mapping, flood forecasting and other aspects of flood risk management analysis.

JFlow

JFlow (developed by JBA) is a 2D flood model which solves depth averaged fluid flow equations to model the movement of water over the ground.

Local Development Framework (LDF)

A non-statutory term used to describe a folder of documents which includes all the Local Planning Authority's Local Development Documents (LDDs). The Local Development Framework will also comprise the statement of community involvement, the local development scheme and the annual monitoring report.

Local Development Documents (LDDs)

All development plan documents which will form part of the statutory Local Development Framework (LDF), as well as supplementary planning documents which do not form part of the statutory development plan.

Main River

A watercourse designated on a statutory map of Main Rivers, maintained by Defra, on which the Environment Agency has permissive powers to construct and maintain flood defences (and powers to control development).

Major development

A major development is:

- a) where the number of dwellings to be provided is ten or more, or the site area is 0.5 Ha or more or
- b) non-residential development, where the floor space to be provided is 1,000m² or more, or the site area is 1 ha or more.

Ordinary watercourse

All rivers, streams, ditches, drains, cuts, dykes, sluices, sewers (other than public sewer) and passages through which water flows which do not form part of a Main River. Local authorities and, where relevant, Internal Drainage Boards have similar permissive powers on ordinary watercourses, as the Environment Agency has on Main Rivers.

Permitted development rights

Qualified rights to carry out certain limited forms of development without the need to make an application for planning permission, as granted under the terms of the Town and Country Planning (General Permitted Development) Order (2010).

Planning Policy Statement (PPS)

A statement of policy issued by central Government to replace Planning Policy Guidance notes.

Pound length

The length of the canal between locks is referred to as pound length.

Previously-developed land

Land which is or was occupied by a permanent structure, including the curtilage of the developed land and any associated fixed surface infrastructure (PPS3 Annex B) (often referred to as Brownfield land).

Reservoir (large raised)

A reservoir that holds at least 10,000 cubic metres of water above natural ground level, as defined by the Flood and Water management Act (2010).

Residual risk

The risk which remains after all risk avoidance, reduction and mitigation measures have been implemented

Resilience

Constructing a building in such a way that although flood water may enter the building, its impact is minimised, structural integrity is maintained and repair, drying & cleaning are facilitated.

Resistance

Constructing a building in such a way as to prevent flood water entering the building or damaging its fabric. This has the same meaning as flood proof.

Return period

The long-term average period between events of a given magnitude which have the same annual exceedence probability of occurring.

Risk

The threat to property and life as a result of flooding, expressed as a function of probability (that an event will occur) and consequence (as a result of the event occurring).

Run-off

The flow of water from an area caused by rainfall.

Section 106 Agreement

Section 106 of the Town and Country Planning Act 1990 (as amended) allowing local planning authorities to negotiate arrangements whereby the developer makes some undertaking if he/she obtains planning permission. These are known interchangeably as planning agreements, planning obligations or planning gain.

Section 106 (Water Industry Act 1991)

A key section of the Water Industry Act 1991, relating to the right of connection to a public sewer.

Shoreline Management Plan (SMP)

A plan providing a large-scale assessment of the risk to people and to the developed, historic and natural environment associated with coastal processes. It presents a policy framework to manage these risks in a sustainable manner.

Standard of Protection (SOP)

The design event or standard to which a building, asset or area is protected against flooding, generally expressed as an annual exceedence probability.

Strategic Environmental Assessment (SEA)

European Community Directive (2001/42/EC) which assesses the effects of certain plans and programmes on the environment.

Strategic Flood Risk Assessment (SFRA)

The assessment of flood risk on a catchment-wide basis for proposed development in a Local Planning Authority area.

Sustainable Drainage Systems (SUDS)

A sequence of management practices and control structures, often referred to as SUDS, designed to drain water in a more sustainable manner than some conventional techniques. Typically these are used to attenuate run-off from development sites and involve infiltration to ground wherever feasible.

Sustainability Appraisal (SA)

An integral part of the plan-making process which seeks to appraise the economic, social and environmental effects of a plan in order to inform decision-making that aligns with sustainable development principles.

TUFLOW

TUFLOW is a software package used for 2-Dimensional river modelling. It is used as an analysis tool for flood risk management.

Vulnerability Classes

PPS25 provides a vulnerability classification to assess which uses of land maybe appropriate in each flood risk zone.

Washland

An area of the floodplain that is allowed to flood or is deliberately flooded by a river or stream for flood management purposes.

Water Framework Directive (WFD)

A European Community Directive (2000/60/EC) of the European Parliament and Council designed to integrate the way water bodies are managed across Europe. It requires all inland and coastal waters to reach "good status" by 2015 through a catchment-based system of River Basin Management Plans, incorporating a programme of measures to improve the status of all natural water bodies.

Windfall sites

Sites which become available for development unexpectedly and are therefore not included as allocated land in a planning authority's development plan.

1 Introduction

1.1 Background

JBA Consulting was commissioned by Wigan Council to undertake a Level 2 Hybrid Strategic Flood Risk Assessment (SFRA). This follows completion of the Greater Manchester Sub-Regional SFRA (August 2008). This is a hybrid SFRA that meets the criteria of both a Level 1 and Level 2 SFRA.

The Level 2 SFRA has been prepared in accordance with current best practice, Planning Policy Statement 25 Development and Flood Risk (PPS25)² and the PPS25 Practice Guide³.

This User Guide has been prepared in support of the SFRA. The guidance should be used to understand the process and procedures required to support development planning and flood risk guidance in accordance with PPS25.

This User Guide has been developed to provide guidance on the use of the SFRA for Local Authority Spatial Planning, Regeneration, Flood Risk Management, Development Management and Emergency Planning.

1.1.1 Flood Risk Assessment

Flooding is a natural process that is not restricted by political demarcations or administrative boundaries. It is primarily influenced by natural factors such as rainfall, tides, geology, topography, rivers and streams and infrastructure such as flood defences, roads, buildings and sewers.

As demonstrated by the summer 2007 floods experienced across England, flooding can cause significant disruption to communities, substantial damage to property and possessions, and loss of life. For these reasons it is important to avoid, as a matter of principle, development in flood risk areas.

Where this is not possible then the vulnerability of the proposed land use to flooding should be considered and measures taken to minimise flood risk to people, property and the environment. This is the basis of the risk-based sequential approach to managing flood risk.

Current Government policy requires LPAs to demonstrate that sufficient consideration 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 exceptionally necessary in flood risk areas, the policy aim is to make it safe without increasing flood risk elsewhere. Whenever possible, overall flood risks should be reduced.

An SFRA is a planning tool that enables the Council to select and develop sustainable site allocations away from vulnerable flood risk areas. The assessment focuses on the existing site allocations within the area but also sets out the procedure to be followed when assessing sites for future development.

It is recognised that considerable land use pressures for re-generation, inward investment and economic growth exist. It will guide the Council in developing strategies, policies and decisions in respect of their Local Development Frameworks (LDFs) and Local Development Documents (LDDs).

² Communities and Local Government (2006) Planning Policy Statement 25: Development and Flood Risk

³ Communities and Local Government (2008) 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 at national, regional and local levels. Whilst the majority of these policies are not aimed at mitigating flood risk, there are key links at strategic and operational levels between land use, spatial planning and Flood Risk Management (FRM) planning. These 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 C.

Table 1-1: Relevant Legislation, Plans, Policies and Strategies

Flood risk	Planning
National level	
<ul style="list-style-type: none"> • EU Floods Directive – EU (2007) • Flood and Water Management Act – Defra (2010) • Future Water – Defra (2008) • Improving Surface Water Drainage – Defra (2008) • Making Space for Water – Defra (2005) • Learning Lessons from the 2007 Floods – Sir Michael Pitt (2008) 	<ul style="list-style-type: none"> • Planning Policy 25: Development and Flood Risk – CLG (2006) • Planning Policy 25: Development and Flood Risk Practice Guide –CLG (2008) • PPS1 Delivering Sustainable Development – ODPM (2005) • Planning Policy Statement: Planning and Climate Change, supplement to PPS1 – CLG (2007) • Planning Policy Statement 12 Local Spatial Planning - CLG (2008)
Regional level	
<ul style="list-style-type: none"> • River Douglas Catchment Flood Management Plan – Environment Agency (2008) • North West Regional Flood Risk Appraisal – 4NW (2008) • Greater Manchester sub-regional SFRA – AGMA (2008) 	<ul style="list-style-type: none"> • North West River Basin Management Plan – Environment Agency (2008)
Local level	
<ul style="list-style-type: none"> • Flood risk assessments for development sites (referred to as necessary in SFRA volumes) 	<ul style="list-style-type: none"> • Emerging Local Development Frameworks for Wigan • Existing UDPs for Wigan
All relevant legislation, plans, policies and strategies - July 2010	

1.1.3 The SFRA

The Level 1 element of an SFRA (incorporated into this Hybrid Level 2 assessment) is based on existing information that is required to make an assessment of flood risk from all sources, both now and in the future. It builds on the Association of Greater Manchester Authorities (AGMA) Sub-Regional SFRA. It provides the evidence for LPA officers to apply the Sequential Test and identifies the need to pass the Exception Test where required. Both of these tests are a fundamental part of PPS25.

The main tasks for the Level 1 SFRA include:

- 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

The SFRA has been developed further and provides evidence for key communities where the Exception Test may need to be applied. It considers the detailed nature of flood hazard taking account of the presence of flood risk management measures such as flood defences. The additional detail can also inform a sequential approach to development allocation within flood risk areas and mitigation options where appropriate.

The main tasks for this Hybrid Level 2 SFRA comprise:

- Development more detailed understanding of hydraulic river models along the River Douglas and tributaries at strategic development locations in the absence of defences.
- Assessment and modelling of residual risks associated with canals
- Detailed surface water flooding maps, delineation of Critical Drainage Areas and recommendations for SWMPs
- Assessment of the consequences of development on flood risk elsewhere
- Assessment of the hydraulic interactions between different sources of flood risk
- Development Strategy
- Recommendations for future work

1.2 SFRA Monitoring

Whilst this SFRA has been produced using the most up-to-date national guidance and flood risk data, it is recommended that the SFRA should 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, in which case a review should be undertaken ASAP. A review of the SFRA should also be undertaken if there are any major national policy changes.

There are a number of key outputs from possible future studies and datasets which are known to be regularly updated. These should be incorporated in any updates to the SFRA. Table 1-2 shows the triggers for revising the SFRA.

Table 1-2: SFRA Review Triggers

Trigger	Sources	Possible Timescale
Douglas 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	United Utilities	Unknown
Greater Manchester Multi-Agency Flood Plan	GM Resilience	Ongoing
Planning Policy	Communities & Local Government	Unknown
Surface Water Management Plans	Wigan Council	Ongoing

2 Guidance for Spatial Planners

The purpose of this section of the report is to provide guidance to Spatial Planners on dealing with allocations using the SFRA.

- **Scope the Sustainability Appraisal of the *Development Plan Document***
 - *Screen development options*
 - *Produce appropriate flood risk indicators*
- **Avoid 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 SFRA 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 a planning constraint;*
 - *Using information provided in the SFRA to assess the 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.*

2.1 Introduction

PPS25 provides the basis for the sequential approach. The LPA should consider flood risk, the mechanism of flooding as well as the spatial distributions and development vulnerability in all stages of the development planning process.

PPS25 promotes positive planning to deliver strategic opportunities that reduce flood risk to communities. The Practice Guide provides further advice on how flood risk should be taken into account in the LDF (See Section 2.19-2.23 of PPS25 PG).

Throughout the risk-based sequential testing process, opportunities to minimise flood risk at each stage of the planning process need to be considered. The primary aim of these actions is to ensure that risks to people and property are effectively managed. The hierarchy of management decisions and actions comprise:

- Avoidance, by locating new development outside areas at risk of flooding;
- Substitution, by changing from more vulnerable to less vulnerable land uses; and,
- Control & Mitigation of residual risks, by implementing suitable flood risk management measures.

The SFRA provides information on flood risk allowing the LPA to:

- Produce appropriate policies for development control and site allocation;
- Produce appropriate flood risk indicators that inform the Sustainability Appraisal;
- Undertake the Sequential Test and (with sufficient and suitable information) Exceptions Testing; and,
- Allocate appropriate land use for development.

It is recommended that a supporting document is prepared, by the LPA, recording decisions made for each proposed development site. This should include all evidence considered in making a decision and this record will form the evidence base that demonstrates that both the Sequential and Exception Test have been applied.

In granting planning permission it will be the requirement of Development Control officers to confirm that all parts of the Exception Test have been addressed. During the initial spatial planning stage, only the likelihood of passing the Exception Test can be assessed. To pass the Exceptions Test a site-specific FRA will be required to identify constraints and demonstrate that safe development is achievable.

The SFRA also provides information to allow planners to make strategic decisions that identify the amount and type of development that may be suitable in the community and the reality of it remaining safe from flooding if allocated. It also identifies potential strategic mitigation strategies that may be required for development to be feasible in the area.

Figure 2-1 illustrates how the flood risk analysis process is taken into account within LDDs by using the SFRA. The flow diagram has been adapted from PPS25 Practice Guide (

Figure 2-2). Each colour represents a key stage in the sequential approach process. Identical colours are used throughout this Chapter to make it easier to identify what guidance relates to individual steps within the sequential approach sequence.

PPS25 Practice Guide assumes a strong link with the Sustainability Appraisal, and the SFRA influences all stages of the Sustainability Appraisal. Hence, the generic flow diagram included in both the PPS25 Practice Guide and this User Guide should be amended to take account of steps which may have previously been implemented within the first pass of the Sustainability Appraisal.

Figure 2-1: Taking flood risk into account in LDDs

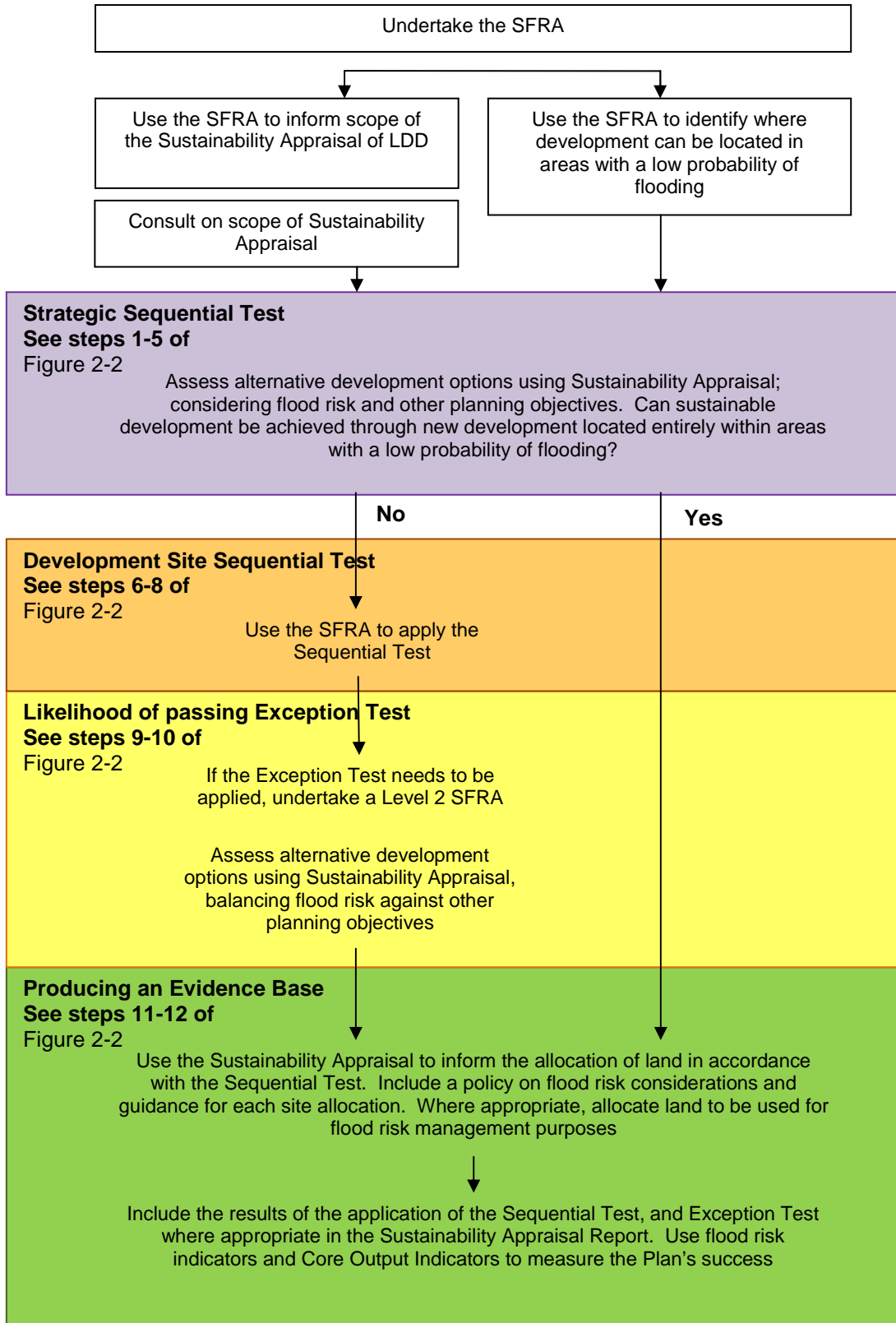


Figure 2-2: Sequential & Exception Test Key Steps

Applying the Sequential Test during the SA of Development Options

- Step 1 - State the **geographical area** 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 **all sources of risk** using the evidence provided in this SFRA
- Step 4 - **Screen available land** for development in ascending order from Flood Risk Zone 1 to 3, including the subdivisions of Flood Risk Zone 3
This can be achieved using the information provided in the Sequential Test Spreadsheet
- Step 5 - Could all development be located in lower risk areas? If not, move onto the next Steps

1st and 2nd Pass of the Proposed Development Sites Sequential Test

Follow Figure 2-4 using the Sequential Test Spreadsheet to:

- Step 6 - Identify those sites which should be **avoided** where risk is considered too great and there is no strategic planning objectives identified in Core Strategy
- Step 7 - Identify those sites in which the consequence of flooding can be reduced through **substitution** within the site boundary
- Step 8 - Assess yield and layout issues for remaining high risk sites to check whether development is viable

Identify the Likelihood of passing the Exception Test

Follow Key Questions imbedded within Figure 2-5 and SFRA evidence to identify the likelihood of those sites remaining at risk passing the Exception Test

- Step 9 - Assess the compatibility of the **development vulnerability** using Table D.2 of PPS25 and identify the requirement of passing the **Exception Test** 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 from this process if:**
- Key Questions in Figure 2-5 attributes a significant negative response
 - Where development will require significant mitigation measures to make the site safe and to reduce impacts downstream
 - Where the requirement of loss of floodplain compensation cannot be delivered

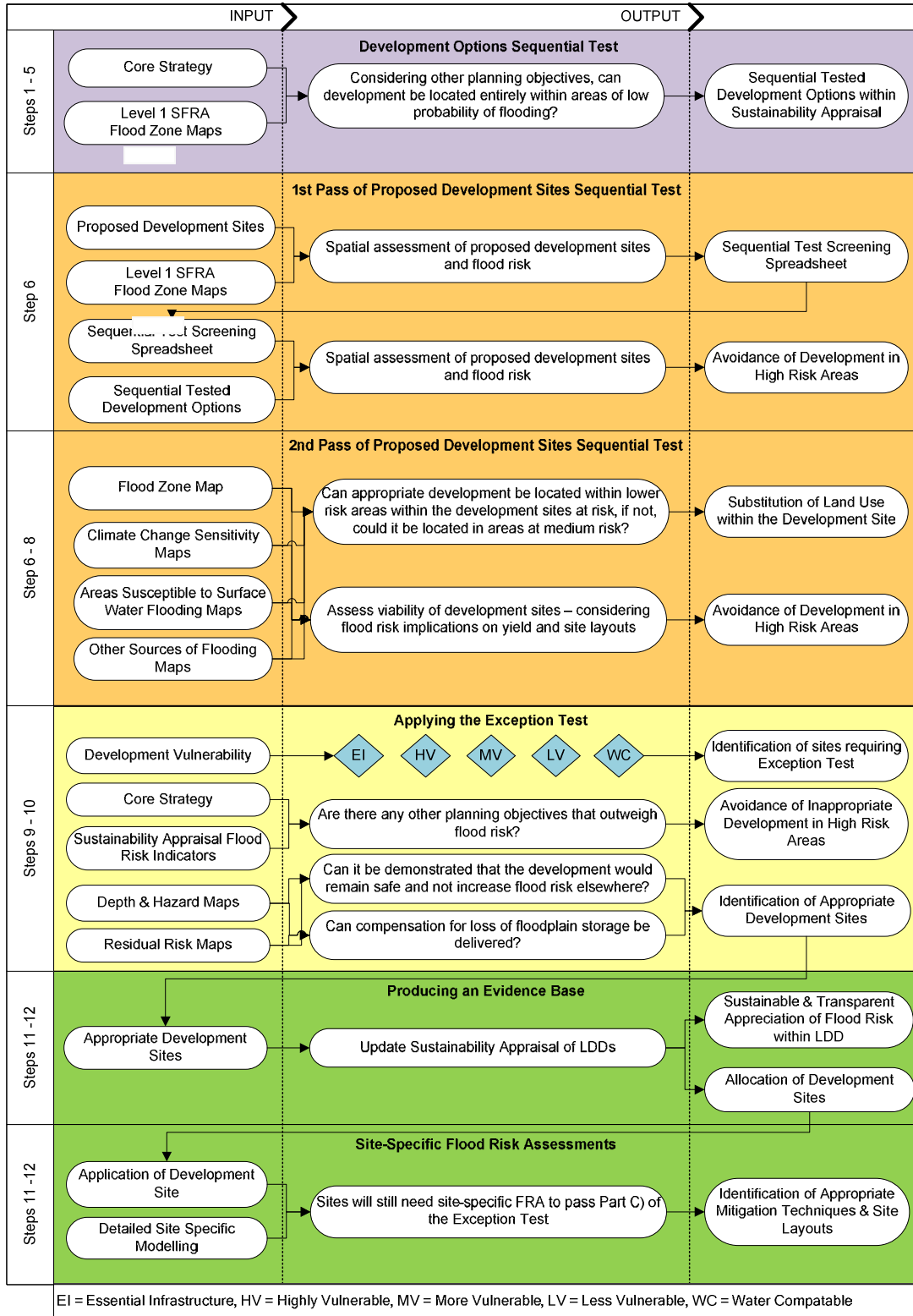
Producing an Evidence Base

The following steps should be used within the SA to produce the evidence that all Tests have been applied:

- 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 - **Allocated 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.

*The Environment Agency and other relevant stakeholders (such as United Utilities, 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*

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



2.2 Sequential Test

When allocating or approving land for development in flood risk areas, those responsible for making development decisions are expected to demonstrate that there are no suitable alternative development sites (of the type and nature proposed by the Core Strategy) located in lower flood risk areas.

PPS25 introduces a Sequential Test that is core to the SFRA process. The Sequential Test is the key driver for the SFRA. In order to carry out the Sequential Test the LPA need to know:

- Spatial extent of flood risk within the whole LPA area
- Flood Zones (See Appendix E)
- Flood Zone 1 – Low Probability: less than 0.1% AEP fluvial flood event
- Flood Zone 2 – Medium Probability: between a 1% AEP and 0.1% AEP fluvial flood event
- Flood Zone 3a – High Probability: with a 1% AEP or greater fluvial flood event
- Flood Zone 3b – Functional Floodplain: land where water has to flow or be stored in times of flood. This is land which would flood with an annual probability of 1 in 20 (5% AEP) or greater in any year or is designed to flood in an extreme (0.1% AEP) flood.
- Flooding from other sources
- Location of proposed development sites and the proposed vulnerability of that development in flood risk terms (See Appendix F)

There are a number of steps that Spatial Planners may follow when Sequentially Testing sites and assessing the likelihood that a site will pass the Exception Test. These are:

- The LPA is required to prioritise the allocation of land for development in ascending order from FZ 1 to FZ 3 (including subdivisions of FZ 3);
- The general approach to be followed when assessing sites is included as Figure 2-5. This, combined with the information provided in the Sequential Test spreadsheet, should be used to identify those sites to be avoided where risk is considered too great;
- Identify those sites where substitution is possible due to high percentage of land within lower flood risk areas;
- Using Figure 2-6, identify those sites that may pass the Exception Test (See section 2.3 for further detail on the requirements for Exceptions Testing). Remove those sites where:
 - i. *There is little or no planning justification to pass Part A of the Test;*
 - j. *Where sites are located on Greenfield land;*
 - k. *Where development will require drastic and complicated mitigation measures to make the site safe.*
- Produce a supporting document recording all decisions made during the decision-making process. Each proposed development site should be referenced and the decisions made to avoid, substitute, or allocate the site and the evidence and/or reasoning used to make the decision should be recorded.
- Those sites which have been allocated must be identified in the relevant LDD accompanied by appropriate FRM policies which the LPA must then use when considering planning applications. These should include the need for an appropriate site-specific FRA.

There are a number of key challenges faced by the LPA in applying the Sequential Test. The Sequential Test is purely based on the Flood Zones as defined by Table D.1 of PPS25, but these zones only take account of fluvial and tidal flooding, which ignore the presence of flood risk management measures such as defences. Other sources of flooding must also be considered in the spatial distribution of development. However, it can be problematic to map the spatial extent of flooding from other sources as well as

matching the level of risk associated with other sources with those presented within the three Flood Zones. For instance, Flood Zone 3 cannot be directly related to a high susceptible area at risk of surface water flooding as the probability and consequences are significantly different.

Whilst it may not be appropriate to avoid development at risk from other sources of flooding, 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.

2.3 Exception Test

If the Sequential Test has been successfully applied, following the steps in

Figure 2-2, and the LPA cannot allocate development in lower flood risk areas, Table D.2 of PPS25 and the vulnerability of development should be referred to. A copy of this table can be found in Appendix F.

Only once the vulnerability of the development is defined using Table D.3 of PPS25 should an assessment be made of whether or not that development is appropriate within that Flood Zone and whether the Exception Test needs to be applied.

Figure 2-4 below has been produced from Table D.3 of PPS25.





















Where new development is exceptionally necessary within areas at risk of flooding, Government policy aims to make it safe without increasing flood risk elsewhere and where possible reducing overall flood risk. This is in accordance with paragraph 19 of PPS25, which states:

“The Exception Test is only appropriate for use when there are large areas in Flood Zones 2 and 3, where the Sequential Test alone cannot deliver acceptable sites, but where some continuing development is necessary for wider sustainable development reasons, taking into account the need to avoid social or economical blight and the need for essential civil infrastructure to remain operational during floods...”




PPS25 explains where and for what type of development the Exception Test needs to be applied. In some situations, for certain types of development, it is not appropriate to use the Exception Test to justify development. For example, highly vulnerable development cannot be justified within the high risk zone through the use of the Exception Test.

Figure 2-4 shows flood risk vulnerability and flood zone compatibility, indicating situations where it is necessary and appropriate to apply the Exception Test, the Exception Test must not be used to bypass the Sequential Test.

Figure 2-4: (Where the Exceptions Test Applies)

Zone	Category				
	EI	HV	MV	LV	WC
1					
2					
3a					
3b					

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

-  Denotes that development would be permitted. An FRA would be required in Zones 2 & 3 and may be required in Zone 1 sites
-  Denoted where Exception Test is required
-  Denotes that development should not be permitted in this zone

There are three stringent conditions, all of which must be fulfilled before the Exception Test can be passed. These conditions (see paragraph D9 of PPS25) are as follows:

- a. 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 (SA);
- b. The development must 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
- c. A site-specific FRA must demonstrate that the development will be safe, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

It will be the requirement of Development Management officers to make sure all parts of the Exception Test have been passed in granting planning permission (see Section 3). At a Spatial Planning stage, only the likelihood of passing the Exception Test can be assessed, as actually passing the Test will require the completion of a site-specific FRA to determine if the site and its occupiers will be safe during times of flood.

What should be done at this early stage of the planning process is to identify those sites in which the Exception Test is required and to avoid those sites in which flood risk is too great, using the information provided in the SFRA, or there is no overriding planning objectives for that development.

2.4 Applying the Sequential Test and assessing the likelihood of passing the Exception Test

This section provides the following guidance on how Spatial Planners are to apply the Sequential and Exception Test within the Sustainability Appraisal of LDDs.

Figure 2-1 identifies how flood risk is taken into account in LDD and introduces the use of the Sustainability Appraisal in applying the Sequential and Exception Tests.

What the guidance below will do, if followed appropriately, is produce clear and transparent evidence that both the Sequential and Exception Test have been applied, which can then feed into the Sustainability Appraisal process of LDDs. This can either be reported within the Sustainability Appraisal itself or a supporting stand alone document which then feeds into the Sustainability Appraisal.

The guidance provided in this SFRA User Guide should not supersede PPS25 or other plans and policies, but should be seen as a practicable approach in how the LPA should apply the Sequential and Exception Tests within the preparation of the LDF.

2.4.1 Spatial Planning Flow Diagrams and Tables

The following flow diagrams and tables provide a recommended approach for Spatial Planners in applying the two tests, keeping in mind the flood risk management hierarchy of avoid, substitute, control and mitigate, whilst identifying and allocating sustainable development sites.

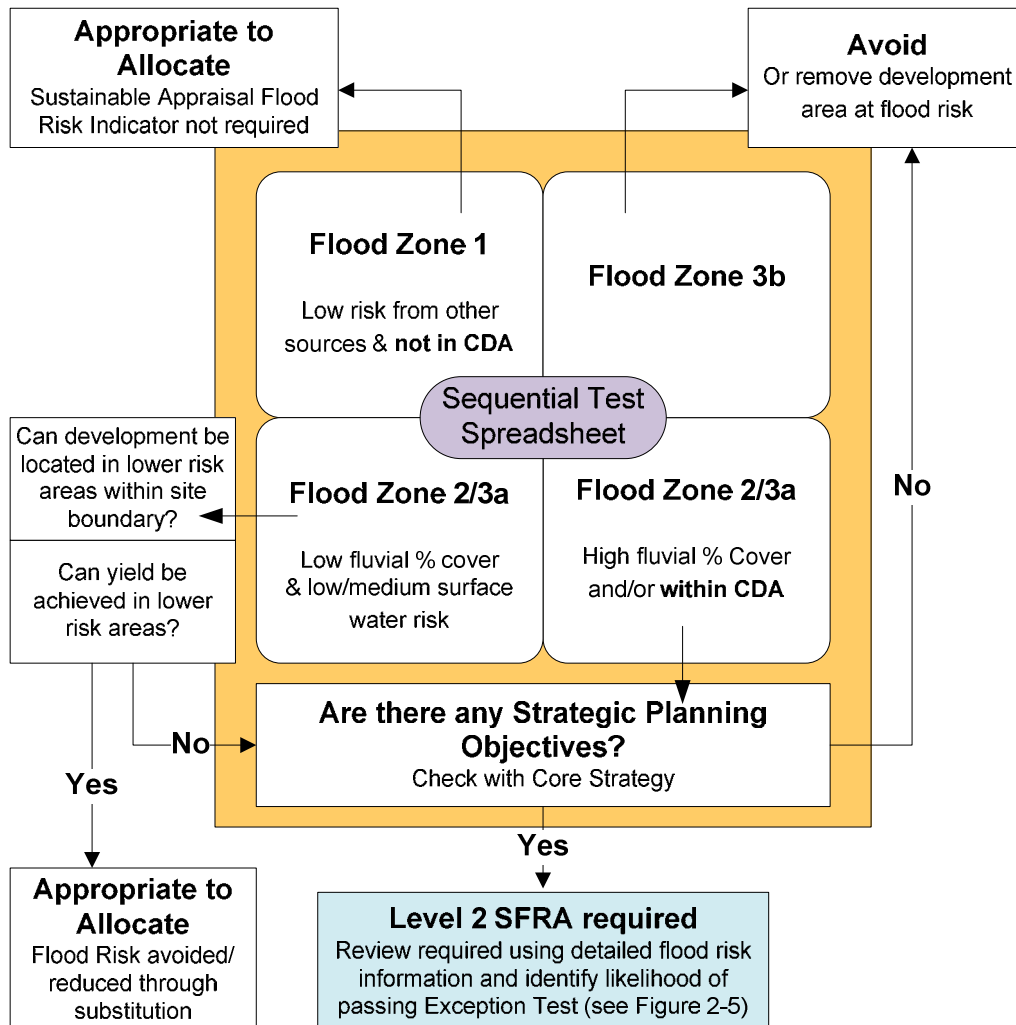
Figure 2-3, illustrates the Sequential and Exception Tests as a process. The main inputs being the evidence provided in the SFRA and the LPA Core Strategy and Sustainability Appraisal. The flow diagram begins by the LPA assessing alternative development options at a strategic scale using the Sustainability Appraisal. This expands to use evidence provided in the SFRA to avoid inappropriate development sites, substitution within the site boundary and identifying those sites requiring Exception Testing. The flow diagram concludes by revisiting and updating the Sustainability Appraisal with the allocation of development sites. Figure 2-4 can be linked to

Figure 2-2, which provides a more detailed descriptive step by step guide of the illustrated flow process.

During this process there is a need to identify which sites should be avoided, substituted, those which can go forward, or once the Sequential Test has been applied how to assess if the site will remain safe during the Exception Test. This is a step wise process and must be documented, but a challenging one as a number of the criteria used are qualitative and based on experienced judgement.

Figure 2-4 provides additional guidance on using the Sequential Test spreadsheet produced in the SFRA. Figure 2-5 provides guidance on how to assess the likelihood of sites passing the Exception Test using key questions and evidence.

Figure 2-5: First and Second Pass of Proposed Development Sites Sequential Test



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.

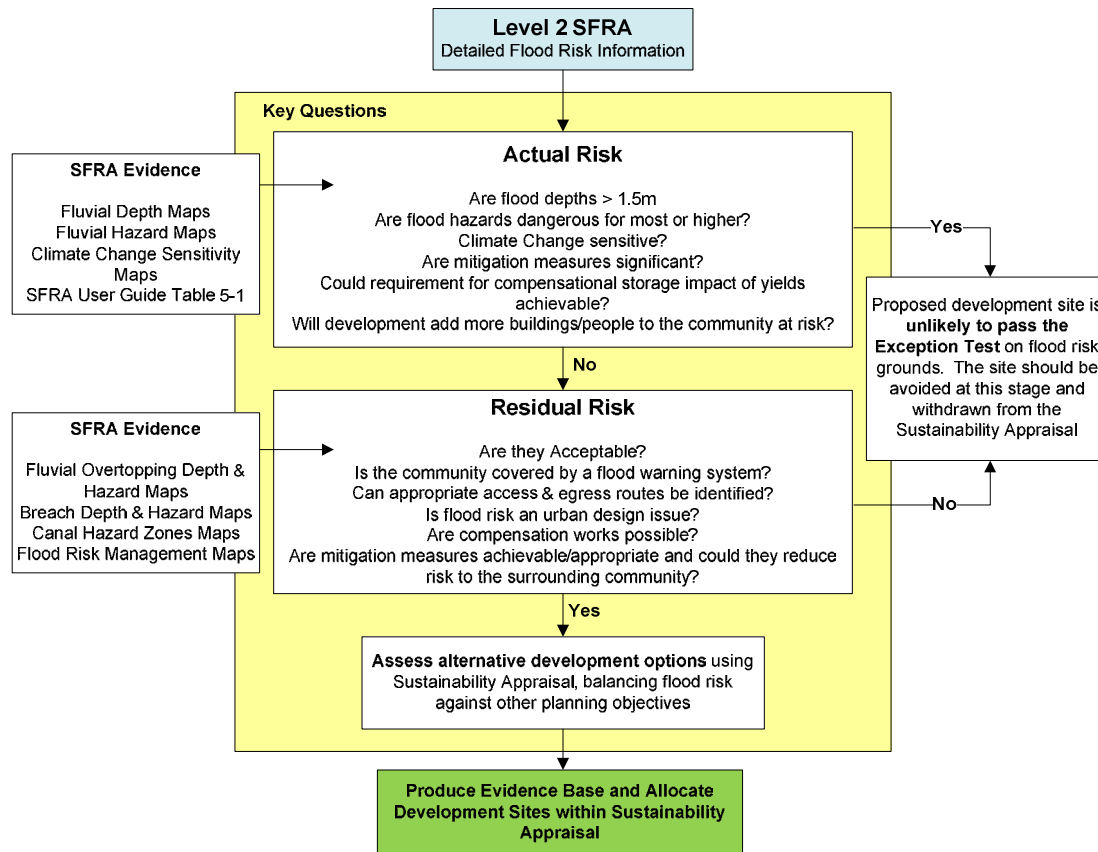
During Steps 9 and 10, Spatial Planners are asked to assess whether or not a site highlighted at flood risk has the potential to pass the Exception Test. This requirement can be linked to Figure 2-5.

By following the process outlined in Figure 2-3, Spatial Planners should be able to obtain a greater understanding on the level of flood risk present at each key development site that remains following the application of the Sequential Test.

During Steps 9 and 10, following

Figure 2-2, 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, Steps 11 and 12 can be carried out, producing the evidence base for the Sustainability Appraisal, allocating appropriate development sites, producing flood risk policies and development guidance.

Figure 2-6: Identifying the Likelihood of Passing the Exception Test



2.5 Flood Risk and other Land Use Policies

Flood risk is a material consideration in land use planning decision making and can greatly impact on the sustainability of various land uses in all locations. Having applied the Sequential Test and Exception Test where necessary, the resultant assessment of appropriateness and 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.

For instance, the Green Infrastructure (GI) of Wigan 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

With regards to flood risk, green spaces can be used to manage storm flows and 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. Green infrastructure (GI) can also improve accessibility to waterways and improve water quality, supporting regeneration and improving opportunity for leisure, economic activity and biodiversity.

The Greater Manchester Green Infrastructure Study was published in September 2008 for AGMA and Natural England on the feasibility of a GI framework for Greater Manchester.

GI should be incorporated into master planning and individual sites, directed by the need to retain exceedance flood paths and natural attenuation of flood flows.

The evidence provided in the Level 2 Hybrid SFRA should be used to enhance the Greater Manchester Green Infrastructure Study by identifying opportunities for delivering FRM measures through GI. River corridors identified as functional floodplain are an excellent linkage of GI and can provide storage during a flood event. Areas identified within the urban environment or upstream of a critical surface water flood areas should be incorporated into council GI strategies. Opening up land to create flow paths or flood storage areas can help protect current and future developments.

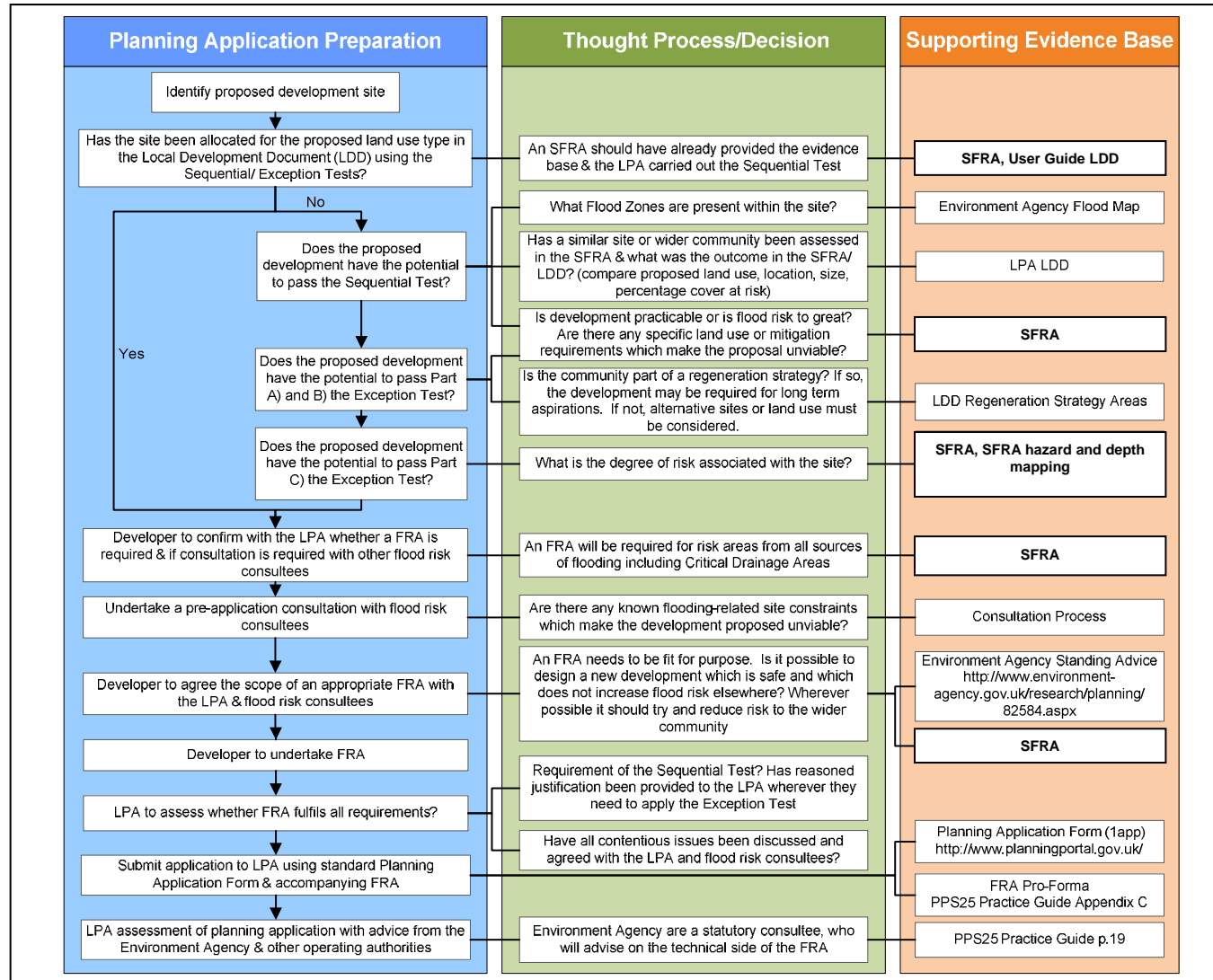
3 Guidance for Development Management

The aim of this section is to provide guidance on the use of the SFRA by Development Management.

When reviewing 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 to identify if the Sequential Test has been applied and development is likely to pass the Exception Test (a site may have already been assessed) ;*
 - *If evidence is available, the Sequential Test and likelihood of passing the Exception Test have been assessed. If no evidence is available, developers must carry out the Sequential and Exception Tests.*
- **Refer developer to the following in order for them to apply the Sequential and Exception Tests**
 - *SFRA (to inform Sequential Test);*
 - *Sequential Test Spreadsheet (to compare similar sites already assessed);*
 - *SFRA (to inform Exception Test);*
 - *SFRA maps (to review scale and nature of flood risk and residual risk);*
- **Consult with Environment Agency and other relevant stakeholders to**
 - *Assess flood risk constraints identified on site using the SFRA*
- **Scope an appropriate FRA**
 - *What is the scale and nature of risk from all sources?*
 - *Does the site lie within a CDA?*
 - *Are there any strategic mitigation requirements identified in the SRA or LDD?*
- **Consult with Environment Agency over FRA acceptance/approval**

Figure 3-1: Planning Applications and Flood Risk



3.1 Introduction

The LPA are the decision-makers on planning applications for new development. Whilst it is the developer's responsibility to fully consider flood risk issues, the LPA should be involved during any pre-application discussions.

Following on from recommendations made in the Pitt Review, Development Management must take some of the roles and responsibilities from the Environment Agency as the first point of call in Flood Risk Management and planning applications.

Flood risk needs to be considered at a strategic level by Development Control officers, even though applications for proposed developments are submitted on a site by site basis. Applications may need to fit within a wider flood risk management strategy for an area rather than on a site by site basis.

Consideration of flood risk within the context of an individual planning application is shown on Figure 3-1. It highlights flood risks that may be taken into account using information provided within the Wigan SFRA, as well as the guidance provided in PPS25 and the EA's Standing Advice.

Development Management officers must always consider development from a strategic view point and the accumulative effect of all proposed development taking place, even though applications for developments are submitted at a site level. It should not be presumed that flood risk has been understood at a strategic high level and that one application may need to fit within a flood risk management strategy for an area.

3.2 The Sequential Test and Exception Test

If the proposed site is already identified in a Sequentially Tested LDD, which is supported by the findings of the SFRA and transparent evidence that the Sequential Test has been carried out, the site will already have been through the Sequential Test. The developer must still apply the sequential approach to site layout when matching land use vulnerability.

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

Developers will need to provide evidence that the Exception Test can be passed. This will be needed for allocated and windfall sites, if required according to the vulnerability of the proposed land use, areas requiring redevelopment or regeneration, redevelopment of existing single properties or changes of use. Development Management will then need to review the evidence provided and decide whether a site passes the Exception Test.

Development in certain existing 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. These should be transformed into flood risk policies within the appropriate LPA LDDs. More detail on mitigation options is also provided in Section 5 of this User Guide.

PPS25 Practice Guide Section 4.20 to 4.39 provides more detail and recommended approach 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 should be referred to.

3.3 Supporting the FRA Process

All development applications must be supported by an appropriate site-specific FRA in accordance with the guidance provided in PPS25 Practice Guide Section 3.70 to 3.89.

At the earliest practical stage, Development Management should refer developers to the SFRA including the associated flood risk mapping. The developer should also be referred to the appropriate LDD and flood risk policies which could potentially influence their development proposals.

If a site has been identified as being at risk of flooding from any source, Development Management and the developer should consult the Environment Agency and other relevant flood risk consultees, such as United Utilities and British Waterways, to identify known flood-related site constraints and agree the scope of an FRA.

The Environment Agency Standing Advice should be used at this stage. This can be accessed online (<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 3-1 outlines when a more detailed FRA may be required.

Table 3-1: FRA considerations and SFRA supporting evidence

Considerations	Supporting evidence in the SFRA
The development other than minor development is situated in Flood Zone 2 and 3	Flood Zone Maps or Flood Zones on Environment Agency website if updated. See PPS25 Practice Guide Section 2.43 for definition of minor developments
The development is >0.5 hectares 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	Critical Drainage Area Maps
The development is at risk of flooding from other sources of flooding	Canal Hazard and refined Surface Water maps
The development is situated behind flood defences (possibility of overtopping during extreme flood event or breach)	Flood Risk Management Maps depth and hazard maps for both the 1 in 100 year and 1 in 1000 year flood events, including the consideration of climate change Fluvial breach maps
The development exceeds 1ha in size	Consult Environment Agency
The development is within 20m of the bank top of a Main River – the Environment Agency will have to consent to any work within 5m of a Main River and are likely to object in principal to any development within these areas	Consult Environment Agency
Any culverting operation or development which controls the flow of any river or stream	Consult Environment Agency

4 Guidance for Developers

The aim of this section is to provide guidance to Developers on using the SFRA.

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

- **Assess whether the site is a**
 - *Windfall development, allocated development within the LDF, within a regeneration area, single property or change of use 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 the LPA that the site passes the Sequential Test and will pass the Exception Test.*
- **Consult with LPA Development Control, the Environment Agency and the wider group of flood risk consultees where appropriate to scope an appropriate FRA if required.**
 - *Guidance on FRAs provided in this SFRA User Guide;*
 - *Refer to Outline Mitigation Strategy identified in the SFRA;*
 - *Also refer to Environment Agency Standing Advice, CIRIA Report C624, PPS25 and its Practice Guide;*
 - *Consult LPA emergency planners if required.*
- **Submit FRA to Development Control and Environment Agency for approval, where necessary**

4.1 Introduction

The SFRA provides the evidence base for developers to assess flood risk at a strategic level and determine the requirements of an appropriate site-specific FRA.

Developers will need to liaise closely with the LPA in the first instance to determine if a site is suitable for development. If a site is considered suitable then developers should prepare a site-specific FRA.

Developers should consider all sources of flood risk when assessing the suitability of a site. Guidance on developing within CDAs and areas at risk from sources other than fluvial flooding is provided in this section.

Figure 4-1 provides a useful overview of the consideration of flood risk within the context of an individual site planning application.

4.2 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 and avoidance of flood risk to new development. These tests may still be required at an individual site level. Table 4-1 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.

If the developer is required to provide evidence that the site can pass the Sequential Test and/or Exception Test if appropriate, then further guidance on these can be found in Section 2 of this User Guide.

Table 4-1: Development types and application of Sequential and Exception Tests

Development / PPS25 PG Reference	Sequential Test Required	Who Applies the Sequential Test?	Exception Test Required?	Who Applies the Exception Test?
Allocated Sites	No	LPA should have already carried out the test during the allocation of development sites within their LDD	Dependent on land use vulnerability (Appendix F)	LPA to advise on the likelihood of test being passed. But the developer must provide evidence that the test can be passed by providing planning justification and producing a detailed FRA
Windfall Sites	Yes	Developer provides evidence that the test can be passed to the LPA. An area of search to be agreed, but should be within local community boundary.	Dependent on land use vulnerability (Appendix F)	Developer must provide evidence that the test can be passed by providing planning justification and producing a detailed FRA
Regeneration Sites Identified Within LDD	No	-	Dependent on land use vulnerability (Appendix F)	LPA to advise on the likelihood of test being passed. But the developer must provide evidence that the test can be passed by providing planning justification and producing a detailed FRA
Redevelopment of Existing Single Properties	No	-	Dependent on land use vulnerability (Appendix F)	Developer must provide evidence that the test can be passed by providing planning justification and

Development / PPS25 PG Reference	Sequential Test Required	Who Applies the Sequential Test?	Exception Test Required?	Who Applies the Exception Test?
				producing a detailed FRA
Changes of Use	No	-	Dependent on land use vulnerability (Appendix F)	Developer must provide evidence that the test can be passed by providing planning justification and producing a detailed FRA

4.3 Site specific Flood Risk Assessments

The principal aims of an FRA are to determine the level of flood risk to a site and to confirm that suitable flood management measures can be developed to control flooding, and safeguard life and property, without increasing risk to the surrounding area.

Once the site has been Sequentially Tested, and has been identified as being likely to pass the Exception Test, a site-specific FRA should be undertaken. The LPA and EA should be consulted in order to determine the content and scope of the FRA.

There are three levels of FRA:

- Level 1 is a screening study used to identify whether there are any flooding or surface water management issues that need to be considered further;
- Level 2 is a scoping study that should be undertaken if the Level 1 FRA indicates that there are flood risk issues that need further consideration; and,
- Level 3, which is a detailed study, where further quantitative analysis is required to fully assess flood issues and confirm that effective mitigation measures can be implemented to control flood risk.

The SFRA is an assessment of flood risk at a strategic level. This information can be used to provide evidence for Level 1 and Level 2 FRAs. Where a more detailed FRA is required, then a developer should undertake a detailed assessment of the flood risk at the site. The scope of the FRA should be agreed by the developer through consultation with the LPA and EA.

Where a more detailed FRA is required the developer should undertake a detailed assessment of the flood risk to the site, using the SFRA to appraise flood risk issues and referring to the guidance in the SFRA User Guide, PPS25, its Practice Guide and CIRIA Report Development and Flood Risk. Developers should satisfy themselves that the data provided in this SFRA is up-to-date and accurate for use in their development proposals.

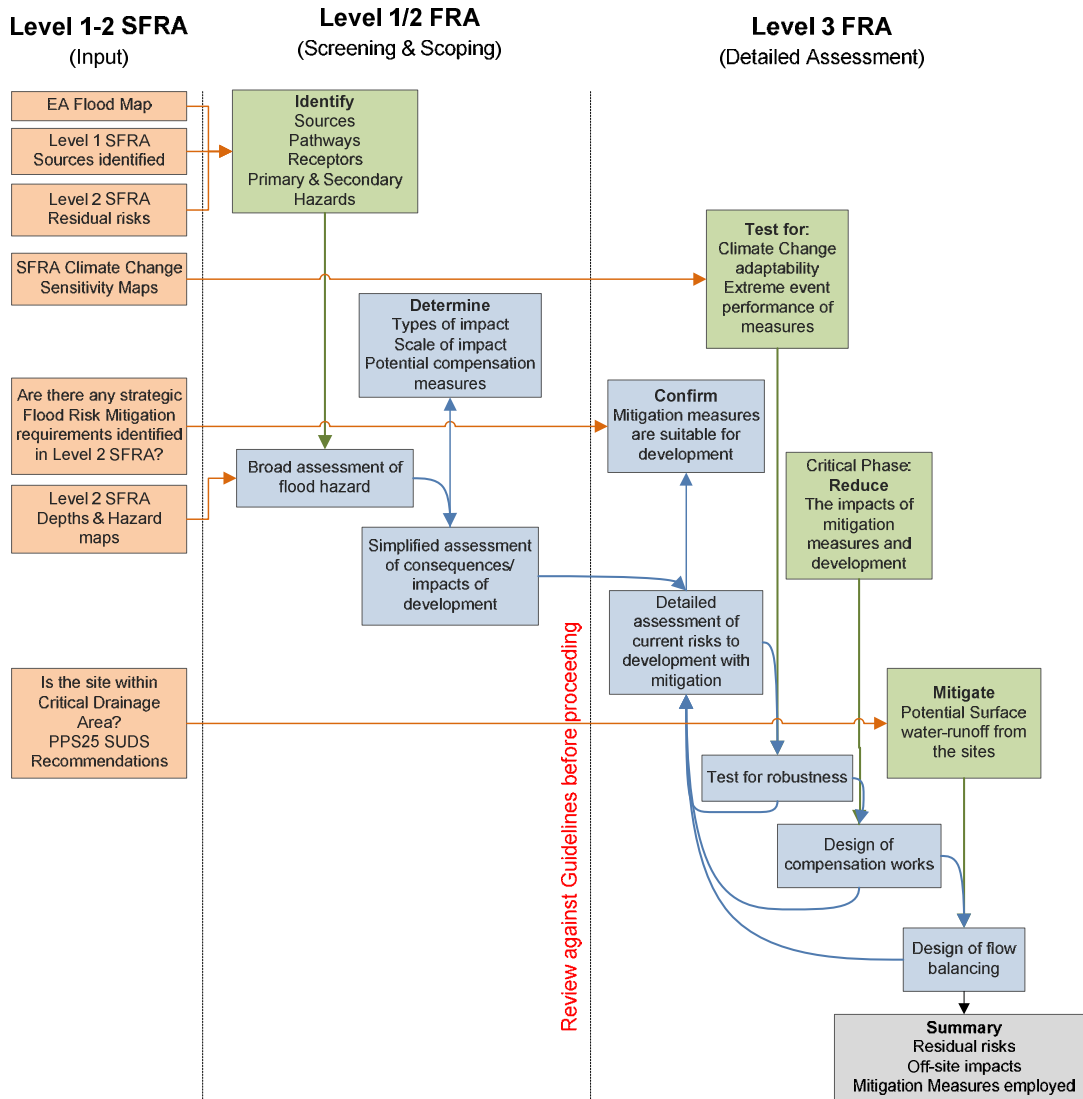
Table 3-1 indicates when a more detailed FRA is likely to be required. The actual scope of the FRA should be agreed between the developer, LPA and Environment Agency before it is undertaken.

The detail required for each level of FRA is highlighted in Figure 4-1. The production of a site-specific FRA can be seen as an iterative process with those carrying out a Level 1 FRA before moving on to a Level 2 and finally a Level 3. It is appropriate to review the level of risk present and assess whether development is appropriate and achievable at each stage of the assessment.

Significant consultation with the LPA and EA may be required for complex development proposals. Complex developments may need to include flood mitigation measures and compensatory storage.

Figure 4-1 also links the evidence provided in the SFRA which can inform the decision making process.

Figure 4-1: FRA Preparation



4.4 FRA Guidance

Flood Risk Assessments should follow the approach recommended by:

- The Environment Agency Standing Advice (<http://www.environment-agency.gov.uk/research/planning/82584.aspx>)
- CIRIA Report C624 Development and Flood Risk (Guidance for the Construction Industry) and;
- PPS25 and its Practice Guide

These documents describe when an FRA is required and the general issues that should be considered. The key requirements of an FRA are provided in Section 3 of the PPS25 Practice Guide. In general, the FRA should address the following issues:

1. Development Description and Locations

- What is the type of development and where will it be located?
- What is the vulnerability classification (Table D.2 of PPS25) of the current and future building use?
- Has the development site been assessed in the SFRA and is it in keeping with LDDs? (If so has the Sequential and Exceptions Testing been completed already?)

2. Definition of Flood Hazard

- What are the sources of flooding at the site?
- For each source how would flooding occur, referencing any historical records.
- What existing surface water drainage infrastructure is present on the site? (Consult with LPA, EA and United Utilities)

3. Probability

- Confirm the FZ designation for the site (refer to the Flood Zone (FZ) Maps)
- Determine the actual and residual risks at the site (refer to the FZ Maps, depth and hazards maps and defences maps)
- What are the discharge rates and volumes generated by the existing site and proposed development?

4. Climate Change

- How is flood risk at the site likely to be affected by climate change?

5. Flood Risk Management Measures

- How will the site be protected from flooding, including the potential impacts of climate change, over the lifetime of the development?

6. Off Site Impacts

- How will the proposed development and measures be implemented to protect the site from flooding and control surface water run-off be designed and implemented?

7. Residual Risks

- What flood-related risks will remain after mitigation measures has been implemented?
- How, and by whom, will these risks be managed over the lifetime of the development?
- Developers should refer to section 6 of this volume for guidance on developing an emergency Flood Plan for a development site.

8. Groundwater

- Although groundwater flooding has not been identified as a major risk within the Wigan area, this mechanism of flooding should be considered particularly when determining the acceptability of SUDs schemes as a way of managing surface water drainage. Developers should consult with the LPA and EA at an early stage of the assessment.

9. Sewer systems

- Where the SFRA has identified a risk of surface water flooding, any water that escapes from the sewer system would tend to follow similar flow paths and pond in similar locations.
- Developers should take account of the guidance for development in CDAs. Where required, liaison with United Utilities should be undertaken at an early stage in the assessment process to confirm localised sewer flooding problems that could affect the site.
- Future development should be designed so that it does not increase existing sewer flooding problems.

4.5 Critical Drainage Areas

In certain locations an increase in the rate of surface water runoff is known to make development susceptible to localised flooding. Insufficient capacity in the surface water drainage system may exacerbate localised flood risk in areas outside of the EA Flood Zones.

A detailed FRA would be expected for planned development within these areas regardless of Flood Zone designation. This should demonstrate that new development is not at risk of flooding from existing drainage systems, will not increase risk to adjacent development or land and will include appropriate mitigation measures to safely control surface water runoff.

Critical Drainage Areas (CDAs) have been mapped as part of the SFRA. Ideally developers shall work closely with the LPA, EA and United Utilities to develop strategies that manage surface water runoff. Where greenfield development is proposed, the aim should be to not increase runoff rates above the existing greenfield rate. Where brownfield development is proposed then the EA actually seek a reduction in the overall runoff rate.

Planning Policy Statement 1⁴ 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.

Wherever possible, this should be achieved through the use of SUDs, constructed within the development site. The effectiveness of a flow management scheme within a single site is 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.

4.6 Considering risk of flooding from other sources

Flood Risk Assessments (FRA) must take account of flood risk from all sources. The SFRA provides a more detailed analysis of actual and residual risk associated with flooding. At some locations there may be hydraulic interactions between different flooding sources. Where this is the case the FRA should look at the possible interactions in more detail. A FRA should reference any completed Surface Water Management Plan for guidance.

This section should be used by spatial planners to inform the development of policies in the Core Strategy on considering the risk of flooding from other sources.

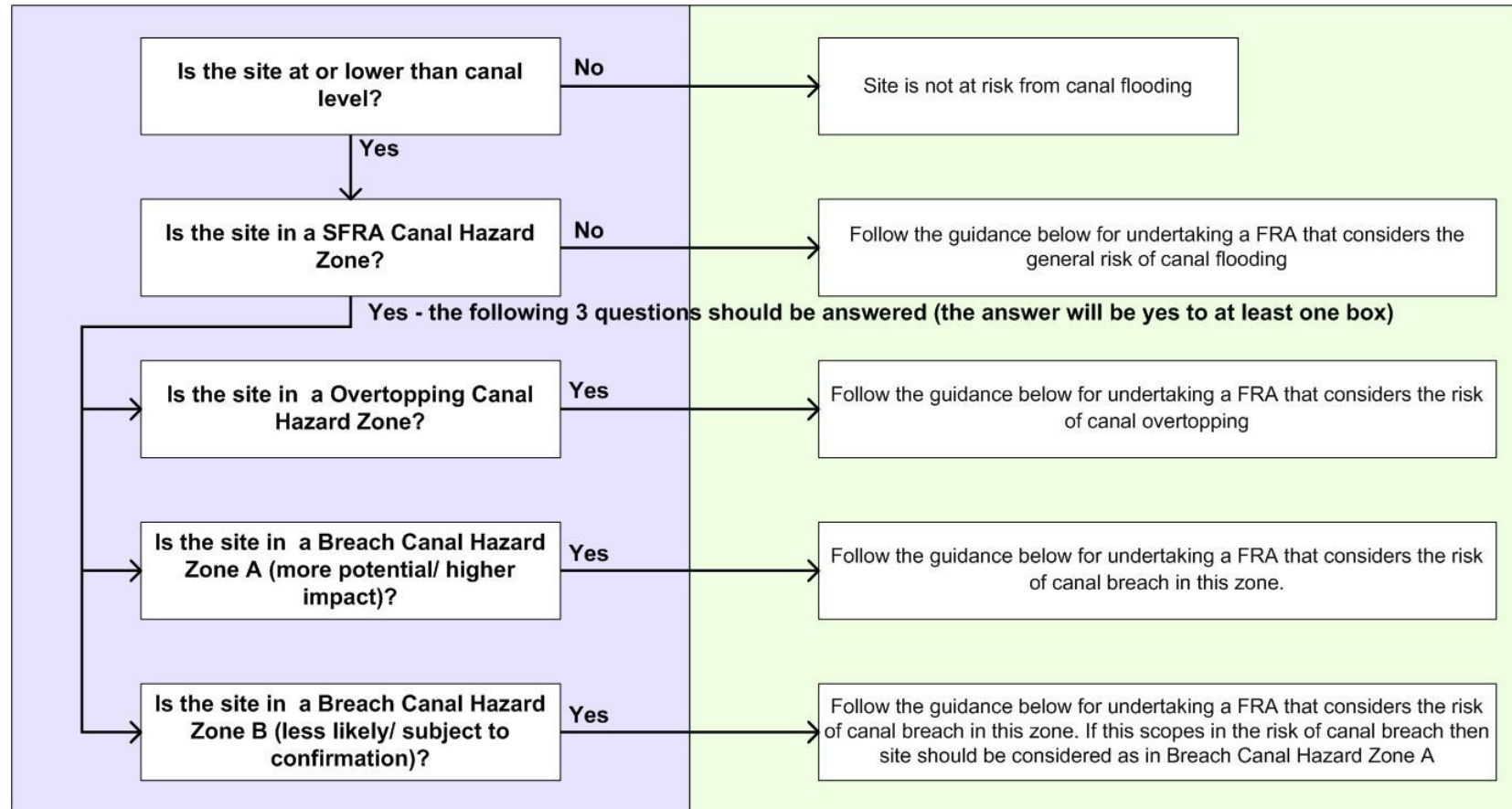
4.6.1 Canals

A FRA should consider the residual risk associated with canals overtopping and breaching. The SFRA has identified indicative canal hazard zones that will aid in this identification process. The developer may refer to Figure 4-2 to determine how the risk of flooding from canals should be considered in the FRA.

The developer should liaise with the LPA and British Waterways to determine applicable emergency planning arrangements.

⁴ DCLG (2007) *Planning Policy Statement: Planning and Climate Change - Supplement to Planning Policy Statement 1*

Figure 4-2: Considering the risk of canal flooding in FRAs



Considering the general risk of canal flooding

Developers should be aware that any site that is at or below canal water level may be subject to canal flooding. However, the canal water volume is finite and a FRA should be used to show in detail what residual risk could be associated with the canal. In its mitigation, building resilience into low level properties may apply or land may be raised.

A series of overtopping and breach appraisals have been undertaken at selected locations along the canal system in Wigan. This mapping has been provided to the Council in digital format. Due to the potentially numerous locations for failure scenarios, the canal mapping is considered indicative only and will need to be reviewed and updated as part of any detailed site specific FRA. The location of breach scenarios were based on the location of elevated canal systems and vulnerable infrastructure. The actual risk of failure, at any location, has not been assessed in this SFRA.

Developing in the SFRA Overtopping Canal Hazard Zone

The risk of canal flooding from overtopping should be considered when applying the Sequential Test and within a site specific FRA. An FRA should consider the following:

- Past incidences of canal overtopping.
- Canal bank levels near the site on either bank.
- A model should be constructed in order to understand the inflows and outflows to the canal during a 1% AEP event, considering climate change. Inflows should consider runoff from towpaths and embankments, culverts, and upstream inflows through bywashes and lock gates. Further to this, a model should be constructed in order to understand overland flow paths in the event of overtopping (at the location(s) from which the site could be affected) and the potential depth and hazard associated with canal flooding to the development site. Any uncertainties and assumptions related to this model should be clearly stated.
- Whether overtopping could cause a breach. In this case the risk of canal breach must be considered as discussed below, assuming if this is the case that the site falls into Breach Canal Hazard Zone A.
- Proposed finished floor levels in relation to the risk of canal flooding. Risks associated with canals could be taken into account by raising floor levels (increasing the designed freeboard levels to take account of the risk), but FRAs will need to consider this along with the implications of other sources of flood risk.
- Residual risks and how they should be managed.

Developing the SFRA Breach Canal Hazard Zone A

The risk of canal flooding from breach should be considered when applying the Sequential Test and within a site specific FRA. An FRA should consider the following:

- Past incidences of canal breach.
- Canal bank levels near the site.
- Canal bank geometry.
- Materials used for the construction of the embankment.
- The structural / geotechnical condition of the canal embankment.
- The condition and capacity of any culverts underneath the canal.
- The condition of any structures such as aqueducts.
- An assessment of the likely mechanisms of canal breach at the location(s) from which the site could be affected.
- A model should be constructed in order to understand peak flows, volumes and overland flow paths in the event of breach and the potential depth and hazard associated with canal flooding to the development site. The canal should be assumed to be at maximum capacity at the time of breach. Any uncertainties and assumptions related to this model should be clearly stated. Additional guidance

on the consideration of canal breach mechanisms should be referred to where necessary⁵⁶⁷.

- Proposed finished floor levels in relation to the risk of canal flooding. Risks associated with canals could be taken into account by raising floor levels (increasing the designed freeboard levels to take account of the risk), but FRAs will need to consider this along with the implications of other sources of flood risk.
- Residual risks and how they should be managed.

Developing in the SFRA Breach Canal Hazard Zone B

The risk of canal flooding from breach should be considered when applying the Sequential Test and within a site specific FRA. An FRA should consider the following:

- Past incidences of canal breach.
- Canal bank levels near the site.
- Canal bank geometry.
- Materials used for the construction of the embankment.
- The structural/ geotechnical condition of the canal embankment.
- The condition and capacity of any culverts underneath the canal.
- The condition of any structures such as aqueducts.
- An assessment of the likely mechanisms of canal breach at the location(s) from which the site could be affected.

The above should be used to scope the likelihood/ feasibility of a canal breach and hence the flood risk to the development site. If a canal breach is considered feasible then the development site should be considered to fall within Breach Canal Hazard Zone A and the guidance in the section above should be applied. If a canal breach is not considered feasible then the FRA should consider what residual risk could be associated with the canal. In its mitigation, building resilience into low level properties may apply or land may be raised.

4.6.2 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. The risk of flooding from reservoirs should be considered in the FRA (which will be subject to the available data and national security implications of such an assessment).

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 British Waterways (2008) British Standards: Hydraulic Design of Canal Works Good Practice Guide

⁶ Dun, R. W. (2006) Reducing uncertainty in the hydraulic analysis of canals, Proceedings of the Institution of Civil Engineers, Water Management 159, pages 211-224

⁷ Dun, R. W. (2007) An improved understanding of canal hydraulics and flood risk from breach failures. Water and Environment Journal 21 9-18.

4.7 Drainage for new developments

Development has the potential to cause an increase in impermeable area, an associated increase in surface water runoff rates and volumes, and a consequent potential increase in downstream flood risk due to overloading of sewers, watercourses, culverts and other drainage infrastructure. It should be borne in mind that the sewer network in places across the Wigan area was designed to drain less development than exists today. Development has added flow over time and the network is known to be at capacity in many places.

Controlling surface water discharges from new development is a crucial consideration if flood risk to new and existing development downstream is to be effectively managed. Planned development can also play a role in reducing the number of properties that are directly at risk from surface water flooding. The Planning System has a key role to play in settings standards for sustainable drainage from new developments and ensuring that developments are designed to take account of the risk from surface water flooding. Sustainable drainage plays an important part in reducing flows in the sewer network and in meeting environmental targets, alongside investment in maintenance and new capacity by United Utilities. United Utilities plan their investment on a five year rolling cycle, in consultation with key partners, including the Environment Agency.

Sustainable drainage and the use of Sustainable Drainage Systems (SUDS) is supported by the policy direction in *Future Water*⁸, *Making Space for Water*⁹, the Pitt Review¹⁰ and the Flood and Water Management Act¹¹ that provides for more sustainable management of the water cycle, working in partnership across different agencies and new responsibilities for local flood risk management. In particular, the Flood and Water Management Act requires developers where practical, to include sustainable drainage in new developments to reduce flood risk and improve water quality. It includes ‘a requirement on developers to demonstrate that they have met national standards for the application of SUDS techniques before they can connect any residual surface water drainage to a public sewer (amending section 106 of the Water Industry Act 1991).’ As part of their new responsibility for local flood risk management, local authorities will be responsible for approving SUDS for new developments and adopting and maintaining them.

Recognising the above, drainage from new developments should incorporate storage, with residual discharge of surface water to the following networks in order of preference:

- Infiltration drainage (e.g. soakaways).
- Discharge to a watercourse
- Discharge to a public sewer

The choice of system will be determined by local ground conditions (including groundwater levels). Whilst infiltration SUDS may be the most suitable for new development, developers must consider the risk of contamination to underlying aquifers.

The guidance below should be used in addition to the Environment Agency Standing Advice¹².

4.7.1 Development sites in the wider local authority districts

Developers should use the following guidance regarding surface water runoff from new developments:

⁸ Defra (2008) *Future Water*

⁹ Defra, Department for Transport, HM Treasury and Office of the Deputy Prime Minister (2005) *Making Space for water: Taking forward a new Government strategy for flood and coastal erosion risk management in England; First Government response to the autumn 2004 Making space for water consultation exercise*

¹⁰ The Pitt Review (2008) *Learning lessons from the 2007 floods*

¹¹ Defra (2010) Flood and Water Management Act © Crown Copyright

¹² Environment Agency. Flood Risk Standing Advice for England - PPS25 National Version 2.0. Can be accessed online at <http://www.environment-agency.gov.uk/research/planning/82584.aspx>

Allowable discharge rates

- Development should deliver Greenfield runoff on Greenfield sites up to a 1 in 100 year storm event, considering climate change
- Development should aim for a reduction in surface water runoff rates of at least 30% for Brownfield sites up to a 1 in 100 year storm event, considering climate change (reduction of 30% was discussed with the Environment Agency Development Team when preparing the SFRA)
- Development should be designed so that there is no flooding to the development in a 1 in 30 year event and so that there is no property flooding in a 1 in 100 year plus climate change event
- There may be local variations on this where outfalls are directly to larger watercourses and hence surface water discharges from development sites can pass downstream before the main peak on the watercourse.

Wherever possible, this should be achieved through the implementation of SUDS. Source control should be considered firstly. There may be opportunities to deliver SUDS through integrated solutions for collections of strategic sites. The future ownership and maintenance of SUDS systems should be discussed at the planning application stage with the relevant sections of the LPA (including Highways and Drainage), United Utilities and the Environment Agency. More detail on SUDS is available in Appendix G.

The developer should liaise closely with the local authority drainage engineer, the Environment Agency and United Utilities to determine appropriate discharge rates. The developer should prove that surface water discharges from the site will not have an adverse impact on flood risk elsewhere, with reference to investment planning by United Utilities that may increase the capacity of the sewer network in the area.

Overland flow paths

Underground drainage systems have a finite capacity and regard should always be given to larger events when the capacity of the network will be exceeded. Hence there is a need to design for exceedance. This should be considered alongside any surface water flows likely to enter a development site from the surrounding area.

Master planning should ensure that existing overland flow paths are retained within the development. As a minimum the developer should investigate, as part of a FRA, the likely depths and extents of surface water flooding on a development site when the national Areas Susceptible to Surface Water Flooding map and/or the surface water mapping produced for the Level 2 SFRA indicate that there is a risk of surface water flooding. This is a precautionary, but an appropriate approach to reduce the risk of flooding to new developments. Green infrastructure should be used wherever possible to accommodate such flow paths. Floor levels should always be set a minimum of 300mm above adjacent roads to reduce the consequences of any localised flooding.

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, existing drainage networks within the site and surrounding area, 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.

4.7.2 Critical Drainage Areas

Certain locations are particularly sensitive to an increase in the rate and volume of surface water runoff from new development. There are generally known local flooding problems associated with these areas. These areas have been defined as Critical Drainage Areas (CDAs) in the SFRA. Specific drainage requirements are required in these areas to help reduce local flood risk. The SFRA has designated CDAs as high flood risk areas.

These are areas with complex surface water flooding problems that would benefit from a drainage strategy, which is most effectively done in a Surface Water Management Plan.

The CDAs provided in the SFRA should be refined over time as more detailed information on flood risk and local flood management assets, including sewer catchments, becomes available.

In these areas, a detailed FRA is required regardless of which Flood Zone that applies for all developments over 0.5 hectares. This should demonstrate that new development is not at risk from flooding from existing drainage systems or potential overland flow routes. It should also demonstrate that the development will not adversely affect existing flooding conditions by the use of appropriate mitigation measures. The FRA should define and address the constraints that will govern the design of the drainage system and layout of the development site.

The Environment Agency Standing Advice allows developers to screen online for the level of flood risk assessment that is appropriate for a development with regard to the PPS25 Flood Zones. This highlights the need for a FRA in Flood Zones 2 and 3 and in Flood Zone 1 where there are critical drainage problems. The Standing Advice notes that for developments in Flood Zone 1 FRA Guidance Note 1¹³ should be followed:

‘In areas where the Local Planning Authority has identified drainage problems through a Strategic Flood Risk Assessment or Surface Water Management Plan and they have indicated that a formal flood risk assessment is required’. FRA Guidance Note 1 requires FRAs to provide ‘Proposals for surface water management that aims to not increase, and where practicable reduce the rate of runoff from the site as a result of the development (in accordance with sustainable drainage principles, and the Local Planning Authority’s published SFRA).’

Proposals for development in Critical Drainage Areas as defined by this SFRA should follow the guidance and standards as set out below for developments that are within any flood zone.

Allowable discharge rates

Development should seek to reduce existing local flooding problems and not add to them. The AGMA authorities are currently developing drainage standards for developments within Critical Drainage Areas. In the interim the following guidance should be followed:

- Development should deliver Greenfield runoff on Greenfield sites up to a 1% AEP storm event, considering climate change
- Development should aim for a minimum reduction in surface water runoff rates of 50% for Brownfield sites, with an aim of reducing runoff to Greenfield rates up to a 1% AEP storm event, considering climate change
- Development should be designed so that there is no flooding to the development in a 1 in 3.33 AEP event and so that there is no property flooding in a 1 in 100 year plus climate change event

Over time, it is envisaged that local authorities will commission drainage strategies (see below) to determine in more detail and establish the evidence base for set reductions in surface water runoff from development sites. With regard to this, the developer should liaise closely with the Environment Agency, United Utilities and LPA as soon as possible 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 SUDS. Source control should be considered firstly. There may be opportunities to deliver SUDS through integrated solutions for collections of strategic sites. The future ownership and maintenance of SUDS systems should be discussed at the planning application stage with the relevant sections of the LPA (including Highways and Drainage), United Utilities and the Environment Agency. This approach should be taken unless the developer can

¹³ Environment Agency. Flood Risk Assessment (FRA) Guidance Note 1, Development Greater Than 1 Hectare (ha) in Flood Zone 1 (and Critical Drainage areas less than 1ha) Can be accessed online at <http://www.environment-agency.gov.uk/static/documents/Research/FRAGuidanceNote1.pdf>

demonstrate that this is not feasible and that there will be no adverse impact caused by the development elsewhere.

This is supported by Category 4 of the Code for Sustainable Homes, which 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. However, the code recommends that attenuation of the additional flows caused by development should be related to the degree of flood risk in an area. In 'high flooding risk areas', 100% of the additional volume should be attenuated.¹⁴ Planning Policy Statement 1¹⁵ allows local planning authorities to stipulate high levels of the code where there are local circumstances that allow and warrant it. **The SFRA has designated CDAs as high flood risk areas.**

4.7.3 Integrated drainage

There is the potential for groups of development sites coming forward to share a central and integrated solution for managing surface water runoff. This is best investigated further through a Surface Water Management Plan (SWMP) or a Drainage Strategy, which may or may not be undertaken at the same time as a SWMP. Such solutions can provide great benefits besides water management, including providing recreational facilities, improving biodiversity and making communities a better place to live. Where there are several sites that would share a communal facility, such sites may be funded through developer Section 106 or Community Infrastructure Levy payments. Drainage Strategies can be particularly useful for considering, recommending the implementation of and long term management arrangements for SUDS and setting appropriate runoff rates from new development. Recommendations for SWMPs and Drainage Strategies have been made in the SFRA.

¹⁴ CLG (2006) Code for Sustainable Homes

¹⁵ CLG (2007) Planning Policy Statement: Planning and Climate Change - Supplement to Planning Policy Statement 1

5 Guidance for Flood Risk Management

5.1 Introduction

Throughout the risk-based sequential approach, opportunities should be taken to minimise flood risk at every stage of the planning process.

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 must be considered. Where the depth of flooding is substantial, these mitigation measures may result in practical constraints to development with significant financial implications.

The minimum acceptable standard of protection against flooding for new property within flood risk areas is the 1% AEP flood event for fluvial flooding, including allowance for climate change over the lifetime of the development.

5.2 Strategic Approach

Mitigation measures should be considered on a strategic basis to avoid a piecemeal approach and partnership is advocated between the LPA and EA. Measures should also be integrated with wider EA flood risk management works and strategies such as the CFMP. Refer to Appendix H for further details.

Outline flood risk mitigation strategies should consider the wider, cumulative impacts of mitigation. This requires master-planning an area from a flood-risk perspective.

In summary, taking a strategic approach to flood risk management involves consideration of:

- Avoidance of development in flood risk areas;
- Implementing a sequential approach to site layout, substituting higher vulnerability development in lower flood risk areas;
- Considering flooding from all sources;
- Wherever possible, using open land or green infrastructure to reduce risk, (e.g. by providing compensatory flood storage);
- Adopting mitigation measures that contribute to the wider community objectives for flood risk management in risk areas, (developers should aim to reduce risk to the wider community);
- The design and use of SUDs; and,
- Preparing emergency flood plans.

5.3 Potential mitigation measures

Table 5-1 summarises the evidence base used in the SFRA to identify what development could be seen as appropriate within a certain flood risk area and what mitigation measures could potentially be adopted to reduce the level of risk. Mitigation measures should fit into the wider strategic FRM approach, that is advocated for a community and ensure that there is no increase in flood risk to the surrounding community. The developer should liaise closely the Environment Agency and Development Management as to what mitigation measures may be suitable.

The Wigan SFRA summarised a range of mitigation measures that could be appropriate. A summary of the measures has been reproduced in Appendix H.

Table 5-1: Possible Mitigation Measures

Flood Source	Risk Zone	Appropriate Development (See categorisation Table F-1 Appendix F) ¹	Comments	Possible Mitigation
Fluvial Depths & Hazards	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 and/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 resilient construction.
	Flood Zone 2, >0.3 depths, Dangerous for some and/or Dangerous for all	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 and/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	Sequential approach to site layout. Raising floor levels is acceptable and they should be raised to 600mm (floor levels are subject to agreed freeboard level with EA and Council) above the maximum water level during a 1% AEP event + climate change. Compensatory

Flood Source	Risk Zone	Appropriate Development (See categorisation Table F-1 Appendix F) ¹	Comments	Possible Mitigation
			risks.	flood storage must be provided, and should be on a level for level, volume for volume basis. Emergency planning must be considered and safe access and egress routes should be identified.
	Flood Zone 3, 1–1.5m depths and/or Dangerous for most	EI, WC & LV	Mitigation is likely to be costly and may not be 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 depths and/or Dangerous for all	None	Flood risk mitigation measures are unlikely to be economically justifiable and all development should be avoided. Development is unlikely to be sustainable and the likelihood of passing the Exception Test is low.	Large mitigation schemes would be required including raised defences. However, this is not a preferred option, as a residual risk of flooding will remain. Compensatory storage must be provided where raised defences remove storage from the floodplain. 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

Flood Source	Risk Zone	Appropriate Development (See categorisation Table F-1 Appendix F) ¹	Comments	Possible Mitigation
				investigated.
Surface Water	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 were 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	Overtopping and breach	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 canal flooding should be part of the FRA with liaison with LPA, EA and British Waterways. The risk could be mitigated through increasing the freeboard of proposed development finished floor levels. Raising the awareness of the risk is critical.
Reservoirs	Location only	EI, WC, HV, MV & LV	Flood risk from reservoirs is residual. Although this will not directly impact on the spatial planning of development, it should influence site emergency planning. Smaller reservoirs could potentially pose the greatest risk.	The risk of flooding should be assessed as part of the FRA. Smaller reservoirs should be assessed to identify the risk and appropriate mitigation put in place.

6 Guidance for Emergency Planners

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.

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 risks provided in the SFRA*
- **Provide advice on developer Flood Plans for new development**
 - *Using outputs from the SFRA*
- **Raise awareness of flood risk from all sources**
 - *Using outputs from the 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) the council is classified as a category 1 responder. During an emergency such as a flood event, coordination with the other category 1 responders (including the emergency services and the Environment Agency) is essential to guarantee the safety of residents. 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 are coordinated through Local Resilience Forums (LRF). Wigan Council is part of the Greater Manchester Resilience Form (GMRF). It is represented on the GMRF by the Chief Executive with lead responsibility in AGMA for civil contingencies, together with the chair of the Local Authority Chief Officers' Civil Contingencies Group.

6.2.1.1 (<http://www.gmep.org.uk/ccm/navigation/greater-manchester-resilience-website/>)

GMRF's overall purpose is to ensure that there is an appropriate level of preparedness to enable an effective multi-agency response to emergency incidents that may have a significant impact on the communities of Greater Manchester. Strategic decision-making and resource allocation are determined by reference to the Greater Manchester Community Risk Register (CRR), and the Forum's work is coordinated through an annual strategy and work programme.

The aim of the SFRA so far has been to try and avoid development in flood risk areas in the first instance. However, it has also been accepted that there is current development in flood risk areas and there will need to be a level of continued regeneration. Minimising flood risk to people, property and the environment should be considered. Flood defences go some way in reducing the current flood risk by providing a standard of protection, however there is still a residual risk associated with them as they can be overtopped or be breached. Flood Warnings is an integral part of flood risk management, for which the

Environment Agency are the lead authority responsible for warning the public, local authorities and emergency services.

Along with the Environment Agency Flood Warning maps (map number D009-001), there are a range of Flood Plans at a sub-regional and local level, outlining the major risk of flooding and the strategic and response framework for key responders. In a major flood requiring strategic coordination, these plans would operate under the command and control framework described in the Greater Manchester Generic Response Plan, supported by the Greater Manchester Strategic multi-Agency Flood Plan.

This SFRA contains useful data to allow emergency planning processes to be tailored to the needs of the area and be specific to the flood risks faced. The detailed maps and GIS layers provided should be made available for consultation by emergency planners during an event and in the planning process.

6.3 Flood Plan Recommendations

The SFRA provides a number of flood risk data sources that should be used when producing or updating flood plans. Plans currently in place or under preparation which impact on Wigan include;

- Greater Manchester Multi-Agency Generic Response Plan (2009)
- Environment Agency Flood Warning Plan
- Greater Manchester Strategic Multi-Agency Flood Plan (2009)
- Wigan Borough Multi-Agency Flood Response Plan (2010)¹⁶
- Multi-Agency Flood Plans (MAFPs) are all produced in line with DEFRA guidance on developing MAFPs.

The data in the SFRA can be used to update these Flood Plans and the Local Authority Emergency Planners may wish to use the assessment to help them in considering and understanding the possibility, likelihood and spatial distribution of all sources of flooding, including fluvial, tidal, surface water and sewer, man-made bodies of water including canals and reservoirs and groundwater flooding, as discussed in the SFRA and associated mapping for the report. This information may support emergency responders in planning for and delivering a proportionate, scalable and flexible response to the level of risk. Relevant sections and maps include:

- Understanding the risk from different sources of flooding
- Flood zone maps
- Climate change maps

Consider and understand the residual risk associated with flood risk management infrastructure including canals using the information provided in the SFRA and the flood depth maps to develop plans proportionate to the risk posed;

- Flood defences, overtopping
- Canal overtopping or breach
- Detailed surface water maps

Use the data in the SFRA to:

- Update the Wigan Borough Multi-Agency Flood Response Plan where necessary to reflect the above findings
- Consider the need for evacuation plans for existing vulnerable institutions and people in the floodplain and other areas at high flood risk
- Develop appropriate warning and informing strategies

¹⁶ Borough Multi Agency Flood Plans have recently undergone a GM peer review process to ensure they are appropriately aligned with the GM Strategic Multi-Agency Flood Plan. The Wigan Borough Multi-Agency Flood Response Plan (draft) will be reviewed against guidance from the peer review process by members of the Wigan Borough Resilience Forum in Autumn 2010 and validated during GM exercising taking place alongside the national Exercise Watermark in March 2011.

- 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
- Review the Greater Manchester Community Risk Register (CRR)

6.4 Planning Approval – Flood Plans including flood warning

As a condition of planning approval flood evacuation plans should be provided by developers that aim to safely evacuate people out of flood risk areas. These plans should detail any prearranged emergency arrangements including dry evacuation routes, flood warning, location of rest centres and safe assembly points.

As of September 2010 precise pathways for flood evacuation plan review (besides that by the Environment Agency) are being taken for consideration at GM level to the AGMA Public Protection Commission.¹⁷

The plan owner must put in place the plan if the development goes ahead, and maintain and update the plan.

According to the PPS25 Practice Guide, flood warning and evacuation plans should include the information outlined in Table 6-1. More detailed analysis should be done within a site-specific FRA that should inform these plans.

Table 6-1: Flood Warning and Evacuation Plans

How flood warning is to be provided
Availability of existing flood warning system
Rate of onset of flooding
How flood warning is given
What will be done to protect the development and contents
How easily damaged items will be relocated
The availability of staff/occupants/users to respond to a flood warning
The time taken to respond to a flood warning
Ensuring Safe occupancy and access to and from the development
Occupants awareness of the likely frequency and duration of flood events
Designing and locating safe access routes
Preparing evacuation routes
Identify safe locations for evacuees
Vulnerability of occupants
Expected time taken to re-establish normal use following an event

¹⁷ The emergency services need to be represented in this process, specifically GMP. The GM Resilience Forum has agreed protocols for signing off any plan which calls on the resources of emergency responders across the sub-region. Both the Fire and Rescue Service Contingency Planning Unit and Greater Manchester Police Emergency Planning Unit have indicated that guidance on a GM approach is necessary

6.5 Flood Awareness

Emergency Planners should also use the outputs from the SFRA to raise awareness within 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.