

CABINET (LOCAL DEVELOPMENT FRAMEWORK) COMMITTEE

25 July 2007

WINCHESTER DISTRICT DEVELOPMENT FRAMEWORK – STRATEGIC FLOOD RISK ASSESSMENT

REPORT OF HEAD OF STRATEGIC PLANNING

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RECENT REFERENCES:

CAB 1472 - Winchester District Local Development Framework – Core Strategy-Progress Report – 7 June 2007

EXECUTIVE SUMMARY:

Planning Policy Statement 1: “Delivering Sustainable Development” sets out the Government’s objectives for the planning system, and how planning should facilitate and promote sustainable patterns of development, avoiding flood risk and accommodating the impacts of climate change. More detailed advice is set out in PPS25 to ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas at highest risk. The guidance requires local planning authorities to appraise the risk of flooding in their areas by undertaking a Strategic Flood Risk Assessment (SFRA).

The Council appointed consultants Halcrow in March 2007 to undertake a Level 1 SFRA of the District, to inform the preparation of the Core Strategy to identify those parts of the District that are most at risk from flooding. This study follows the advice and procedures set out in PPS25, and has the support of the Environment Agency, the responsible authority for flood defence in England.

This Level 1 report identifies where further work may be required pending the spatial options to be explored through the Core Strategy, in that any potential development sites/areas that lie within Flood Zone 2 or 3 will require a more detailed flood risk assessment following the Sequential Approach advocated in PPS25.

RECOMMENDATIONS:

- 1 That the Committee note the report and its content that will be used to inform the emerging issues and options for the Core Strategy and other development plan documents as appropriate.
- 2 That the Head of Strategic Planning be given delegated authority, in consultation with the Portfolio Holder for Planning and Transport, to agree any minor changes and alterations to the SFRA report which may be needed prior to its publication.

## CABINET (LOCAL DEVELOPMENT FRAMEWORK) COMMITTEE

25 July 2007

### WINCHESTER DISTRICT DEVELOPMENT FRAMEWORK – STRATEGIC FLOOD RISK ASSESSMENT

#### DETAIL:

#### 1 Introduction and Background

- 1.1 Planning Policy Statement 1: “Delivering Sustainable Development” sets out the Government’s objectives for the planning system, and how planning should facilitate and promote sustainable patterns of development, avoiding flood risk and accommodating the impacts of climate change. This advice is set out in detail in Planning Policy Statement 25 (PPS25) Development and Flood Risk (December 2006).
- 1.2 The aim of PPS25 is to ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas at highest risk. The guidance requires local planning authorities to :-
  1. appraise the risk of flooding by undertaking a Strategic Flood Risk Assessment (SFRA) (which will also contribute to the Sustainability Appraisal of the LDF).
  2. manage the risk through policies which provide for development in locations which avoid flood risk, only permitting development in areas of flood risk where there are no reasonably available sites in areas of lower flood risk and the benefits of the development outweigh the risks from flooding.
  3. reduce the risk of flooding by safeguarding land from development that is required for current and future flood management; reducing flood risk to and from new development through location, layout and design and incorporating sustainable drainage systems.
- 1.3 In terms of the Local Development Framework, PPS25 advises that local planning authorities should prepare policies for the allocation of sites and the control of development which avoid flood risk to people and property. However, before any options can be explored through the Core Strategy as to the locational requirements of any new development it is necessary to undertake a SFRA to identify those parts of the district that are most at risk from flooding.
- 1.4 To undertake this work, the Council appointed Halcrow in March 2007. Halcrow had recently completed work for Hampshire County Council and had a range of base information on which to compile a SFRA for the Winchester District. In addition they had the agreement of the Environment Agency as to the scope of the study and the methodology to follow. The Environment Agency plays a critical role in the SFRA as they are the responsible authority for flood defence in England, in addition to being a statutory consultee for the LDF, sustainability appraisal and strategic environmental assessment.

- 1.5 The Winchester SFRA includes an explanation of PPS25, its Practice Companion Guide, Environment Agency flood zones and flood maps, a methodology for this study together with an assessment of flood risk in this study area and guidance on the application of the sequential test.
- 1.6 In addition to this study, the Partnership for Urban South Hampshire (PUSH) authorities led by Havant Borough Council appointed Atkins in late 2006 to undertake a SFRA for the PUSH area to inform the consideration of sites being allocated for development as part of the sub regional strategy. Whilst the Atkins report includes that part of the Winchester District within the PUSH area, it was necessary to commission this Halcrow study for the whole of the District to get a comprehensive overview of flooding matters to ensure that the district has a sound and robust evidence base for its LDF. Halcrow have been liaising with Atkins to ensure that the results of the two studies are compatible.

## 2 Strategic Flood Risk Assessments (SFRA)

- 2.1 PPS25 and its companion guide give detailed guidance as to the form and content of an SFRA, which in brief requires a sequential risk-based approach to determining the suitability of land for development in flood risk areas. The aim of applying a sequential test is to steer new development to areas at the lowest probability of flooding (zone 1).
- 2.2 The flood zones are the starting point for the sequential test. These use the Environment Agency flood maps which indicate flood zones 2 and 3, flood zone 1 being all the land falling outside zones 2 and 3. SFRA refine the information on the probability of flooding by taking into account other sources of flooding and climate change. PPS 25 defines the flood zones as follows :-

### **Zone 1 - Low Probability**

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

### **Zone 2 - Medium Probability**

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

### **Zone 3a - High Probability**

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

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

This zone comprises land where water has to flow or be stored in times of flood. SFRAs should identify this Flood Zone (land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1%) flood, or at another probability to be agreed between the Local Planning Authority (LPA) and the Environment Agency, including water conveyance routes).

- 2.3 The companion guide to PPS25 identifies levels of flood risk assessment, together with sources of information. A Level 1 SFRA is very much a screening exercise, being based upon existing data whether this be Environment Agency flood maps, catchment management plans, local knowledge and records of flooding events and should include the following key outputs :-
- plans showing the local authority area, ordinary watercourses and flood zones, including the functional flood plain where appropriate;
  - an assessment of the implications of climate change for floodrisk;
  - areas at risk of flooding from sources other than rivers and the sea
  - to identify and take into account floor risk management measures including flood defences and emergency warning systems
  - identify locations where development would significantly increase the risk of flooding elsewhere.
- 2.4 Halcrow were commissioned to undertake a Level 1 study for the whole of the Winchester District at this stage following the concept of this sequential approach.
- 2.5 The Report includes a description of the planning context for the area, a description of the PPS 25 requirements, and a study methodology. One important aspect of the study is a series of maps covering the Winchester District, showing flood zones 2 and 3 and indicating localised flooding areas. The maps form a critical part of this study as they identify Flood Zones 2 and 3 and start to highlight areas requiring more detailed work. The maps are not appended to this report or available on the web due to their size and complexity. An example will be brought to the meeting to illustrate to Members the initial results of this Level 1 study.
- 2.6 It may however be necessary to commission further work and proceed to the next level of a SFRA depending on the spatial options to be explored through the Core Strategy. The Executive Summary of this Level 1 report is set out below. However, due to the size of the full report the text is available on the website.

#### Executive Summary of Winchester SFRA

*“In March 2007, Winchester City Council commissioned Halcrow to produce a Strategic Flood Risk Assessment in accordance with Planning Policy Statement 25 (PPS 25) and the recently published document: Development and Flood Risk, a Practice Guide Companion to PPS 25 (February 2007).*

*This Strategic Flood Risk Assessment and the scoping stage of a Sustainability Appraisal, which is being prepared by Enfusion Ltd, will inform the plan-making process of the Local Development Framework. They will in particular inform the Core Strategy, the Development Provision and Allocations and the Development Control Policies development plan documents.*

*This report provides an overview of the methodology, assumptions, uncertainties, tasks undertaken and the links to the wider sustainability appraisal process. It provides policy recommendations and guidance for the application of the Sequential*

*Test, the preparation of flood risk assessments and the use of sustainable drainage systems, within the City Council's administrative boundary*

*Since the South East Hampshire and the Test and Itchen Catchment Flood Management Plans (CFMPs) are yet to be completed, it is recommended to base policies and actions from similar CFMP policies where these have been developed. The proposed main message and implementations for this SFRA and consequently the Local Development Framework are:*

*The proposed main message and implementations are:*

<b>Main Message</b>	<b>SFRA Implementations</b>
<p><i>PPS25 provides the policy framework to make sure that flood risk is considered in new developments. There does not need to be a radical change in the way the risk is managed in these areas. The aims are to continue to maintain watercourses, increase flood awareness and provide appropriate flood warnings.</i></p>	<p><i>Make sure that the flood risk is managed appropriately in these areas by applying PPS25. The aims of PPS25 are to ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas at highest risk. There may be exceptional circumstances where new development is necessary. In such areas, policy aims to make it safe without increasing the risk elsewhere and, where possible, to reduce the overall flood risk. Structural works may be required to reduce flood hazard within acceptable limits at Level 2 SFRA locations.</i></p>

*Further more detailed work may be required to determine more precise locations appropriate for development pending the undertaking of the Sequential Test. It is likely that flood hazard mapping (which identifies the level of risk to life and property) may be required as a Level 2 SFRA, at all locations where the Exception Test will need to be undertaken".*

- 2.7 PPS 25 identifies uses that may be vulnerable to flooding and advises that more vulnerable property types such as residential development will not be allocated to areas at high risk of flooding. However, the advice then recognises that there may be exceptional circumstances and a valid reason why a development type is not entirely compatible with the level of flood risk at a particular site and why a site may need to be considered under the Exception Test procedure. The Exception Test can only be applied following application of the Sequential Test. The consequences of this advice is that it may be necessary to go to the next, more detailed, stage which will include an examination on the flood defence mechanisms and detailed modelling on the variation of risk within the flood zones. A Level 2 SFRA will need to be undertaken at the preferred option stage of Core Strategy preparation to ensure that the preferred spatial options are deliverable.

2.8 This Level 1 report also recognises the issue of groundwater flooding in the District and suggests a policy approach to be followed. This matter will need to be explored further through the LDF. It also provides guidance for the application of sustainable drainage systems where various approaches can be used to manage surface water drainage in a way that reflects the natural environment.

### 3 Conclusions and Next Steps

3.1 The Executive Summary refers to the possibility of undertaking a Level 2 SFRA. This requires more in depth analysis of past flooding events, together with modelling of the variation of risk within the flood zones, and the availability of flood defence infrastructure. This level of assessment will be required, if, through the Core Strategy process, the spatial options include the possibility of identifying land for development that lies within or very close to Flood Zones 2 or 3.

### OTHER CONSIDERATIONS:

#### 4.1 CORPORATE STRATEGY (RELEVANCE TO):

This study will contribute to a number of the wider corporate aims of the Council:-

- To promote a healthier, safer and more caring community;
- To promote a thriving local economy throughout the District;
- To protect and improve the natural and built environment for the benefit of present and future generations

#### 4 RESOURCE IMPLICATIONS:

4.1 The funding of this project is included within the growth bid for the LDF Reserve, agreed by Cabinet in February 2007 (CAB1481).

### BACKGROUND DOCUMENTS:

Appendices A and B.

### APPENDICES:

Appendix A – Winchester Strategic Flood Risk Assessment for the Local Development Framework - Halcrow Final Proposal March 2007

Appendix B - Winchester Strategic Flood Risk Assessment July 2007

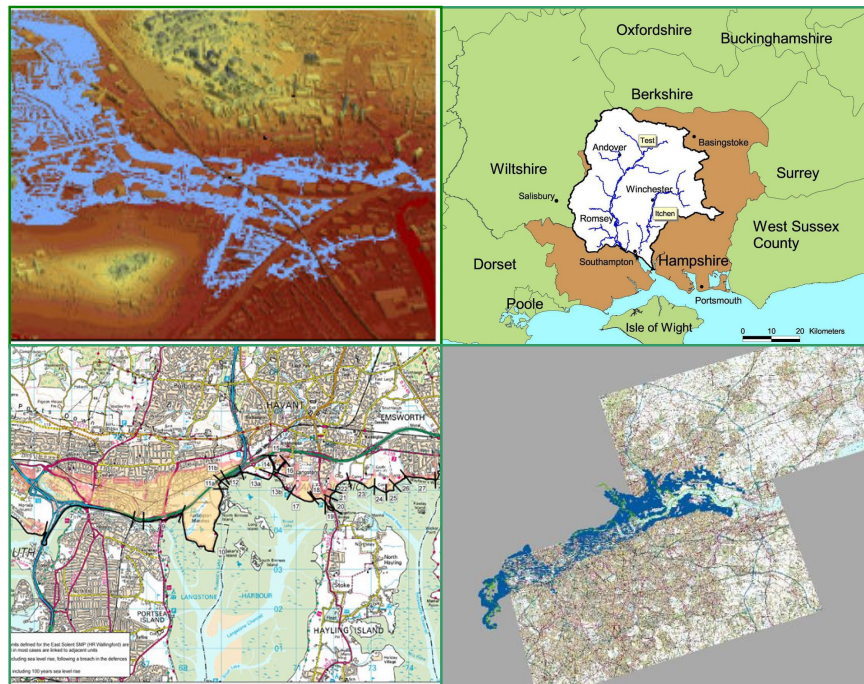
Please note that because of their size, the documents referred to as being appended to this Report are not attached. Appendix A (Winchester Strategic Flood Risk Assessment for the Local Development Framework - Halcrow Final Proposal March 2007) and Appendix B (Winchester Strategic Flood Risk Assessment July 2007) are available in the Members' Library and on the Council's Website via the following link:

<http://www.winchester.gov.uk/CouncilAndDemocracy/DemocracyAndElections/Committees/>

# Winchester City Council Strategic Flood Risk Assessment for the Local Development Framework

Final Proposal  
March 2007

**Halcrow Group Limited**





Winchester City Council

Strategic Flood Risk Assessment for the Local  
Development Framework

Final Proposal  
March 2007

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Winchester City Council

Strategic Flood Risk Assessment for the Local Development  
Framework

Final Proposal

### Contents Amendment Record

This report has been issued and amended as follows:

Issue	Revision	Description	Date	Signed
1	0	Final Proposal	Mar 07	BV

# Contents

Proposal Summary	1
<b>1 PROJECT APPRECIATION</b>	<b>3</b>
1.1 <i>Project Aims</i>	3
1.2 <i>Levels 1 and 2 Assessments</i>	4
1.3 <i>Main Project Requirements</i>	4
1.4 <i>Specific Project Requirements</i>	5
1.5 <i>Project Outputs, Output Materials and Outcomes</i>	6
<b>2 STUDY METHODOLOGY</b>	<b>7</b>
2.1 <i>Strategic Approach</i>	7
2.2 <i>General Methodology</i>	8
2.3 <i>Data Gathering and Quality of Information</i>	9
2.4 <i>Inception Meeting</i>	10
2.5 <i>Level 1 SFRA</i>	10
2.6 <i>Preparation of Strategic Flood Risk Maps</i>	11
<b>3 PROJECT TEAM</b>	<b>12</b>
3.1 <i>Project Organisation</i>	12
3.2 <i>Key Staff</i>	13
3.3 <i>Biographies of Key Staff</i>	14
3.4 <i>Lines of communication</i>	17
<b>4 SKILLS &amp; EXPERIENCE</b>	<b>18</b>
4.1 <i>Halcrow Group Ltd</i>	18
4.2 <i>Details of Similar Work and Our Effectiveness</i>	18
4.3 <i>Relevant Experience for Public Clients</i>	21
4.4 <i>Strategic Flood Risk Studies</i>	22
4.5 <i>Coastal Strategy Projects</i>	23
<b>5 PROJECT EXECUTION</b>	<b>27</b>
5.1 <i>Programme</i>	27
5.2 <i>Progress Reports</i>	27
5.3 <i>Meetings</i>	27
5.4 <i>Risks and Proposed Mitigation</i>	27
5.5 <i>H&amp;S, Quality and Environmental Systems</i>	28
<b>6 Proposed Fees</b>	<b>29</b>
<b>7 Supporting Information</b>	<b>30</b>

## **Glossary**

<b>SFRA</b>	Strategic Flood Risk Assessment
<b>CFMP</b>	Catchment Flood Management Plan
<b>Defra</b>	The Department for the Environment, Food and Rural Affairs
<b>LDD</b>	Local Development Document
<b>GIS</b>	Geographic Information System
<b>IDB</b>	Internal Drainage Board
<b>iSIS</b>	Industry-standard hydraulic modelling software, developed by Halcrow
<b>LiDAR</b>	Light Detection and Ranging
<b>LDF</b>	Local Development Framework
<b>NEECA<sup>2</sup></b>	National Engineering and Environmental Consultancy Agreement Framework
<b>NFCDD</b>	National Flood and Coastal Defence Database (Environment Agency)
<b>PPG25</b>	Planning Policy Guidance Note 25
<b>PPS25</b>	Planning Policy Statement 25
<b>SFRM</b>	Strategic Flood Risk Management (Environment Agency Framework)
<b>SMP</b>	Shoreline Management Plan
<b>FLAWS</b>	Floodplain Land Use Optimising Workable Sustainability project
<b>IUD</b>	Integrated Urban Drainage
<b>SUDS</b>	Sustainable Urban Drainage Systems

## Proposal Summary

### Summary of scope, costs and timescales

We are keen to assist Winchester City Council in the preparation of a Strategic Flood Risk Assessment for the Local Development Framework. A Strategic Flood Risk Assessment (SFRA) is used as a tool by a planning authority to assess flood risk through the application of the sequential test (Planning Policy Statement 25) for spatial planning, producing development briefs, setting constraints, informing sustainability appraisals, identifying locations of emergency planning measures, etc.



Roger Prescott

Halcrow is in a unique position to offer the most advantageous value for money proposal, because our staff have gained much of the required local knowledge by preparing a large scale SFRA for Hampshire County Council (as part of the Sustainability Appraisal of the Hampshire Minerals Plan and Hampshire Waste Management Plan), the study of the Hampshire Floods in 2000-2001 and three Catchment Flood Management Plans in Hampshire. The Environment Agency, Hampshire County Council, Southern Water and the Partnership for Urban South Hampshire (PUSH) have given permission to use their data, for your benefit and without any charges.



We estimate that the cost of the SFRA can be reduced to £8,000 (exc. VAT) for a Level 1 SFRA, as defined in the recently published Companion Guide to Planning Policy Statement 25 (PPS25). The study will cover the administrative boundary of the City. The anticipated completion dates for the draft and final reports are 30<sup>th</sup> of May and 30<sup>th</sup> of July 2007 respectively and the proposed core team is available and can start on 19<sup>th</sup> of March.

We will provide a Strategic Flood Risk Assessment that will be in accordance with PPS25 and its Companion Guide (Feb 2007).

### Our capabilities

Halcrow is the UK's premier consultant in all aspects of flood risk assessment (source: NCE Consultant's File), with an active R&D programme (see [www.halcrow.com/innovation](http://www.halcrow.com/innovation) and [www.halcrow.com/software](http://www.halcrow.com/software)).

Halcrow has a strong accredited environmental management system which has been certified under ISO14001:2006 and under EMAS (Eco-Management and Audit Scheme). In addition to this, the Halcrow Group business system is an integrated system for quality, environmental and health & safety management which meets the requirements of BS EN ISO 9001, BS EN ISO 14001 and OHSAS 18001. Halcrow is one of six consultants on the Strategic Flood Risk Management Framework (SFRM) and National Engineering and Environmental Consultancy Agreement Framework (NEECA<sup>2</sup>), led by the Environment Agency.

As a multi – disciplinary consultancy, Halcrow is able to provide the skills and experience that this assessment requires. Our team includes specialists involved in a number of the recent and ongoing strategic flood risk assessments; we have allocated the same resources for this study as for the Hampshire County Council SFRA. The lead project positions have been selected on the basis of leadership, expertise and local knowledge:



Our proposed Project Director, Roger Prescott (see photograph on page 1) is a Town & Country planner who worked for twenty years for Hampshire County Council in a wide range of topics and responsibilities. He managed, for example, an Urban Regeneration capital programme of nearly £2M per annum in Portsmouth, Southampton, Gosport, Aldershot and Eastleigh. Roger will take overall responsibility of the project.

Our proposed Project Manager, Bruno Venturini is a chartered engineer (ICE). He has successfully completed and reviewed in excess of fifty flood risk assessments and strategic flood risk assessments over the last five years. Bruno has represented Halcrow in the preparation of PPS25 and has been project manager on a number of major strategic flood risk studies with fees over £120,000. He is the Project Manager for the Hampshire County Council SFRA.



# 1 PROJECT APPRECIATION

## 1.1 Project Aims

1.1.1 SFRA's are planning tools that provide the information required for:

- sequential testing of site allocations and for the application of Exception Tests if necessary;
- preparing policies for flood management;
- informing the Sustainability Appraisal of Local Development Document (LDD) options;
- identifying the level of detail required for site-specific flood risk assessment in particular locations;
- assisting to determine the acceptability of flood risk in relation to emergency planning capacity.

PPS25 SEQUENTIAL APPROACH			
Stage One Identify Flood Zone (EA Maps)	Stage Two Zone 3a, 3b (SFRA maps)	Stage Three Consideration of land use vulnerability	Stage Four Exception Test
<b>1</b> <b>Low Probability</b> Annual probability of flooding: River, tidal and coastal <0.1%	→	All uses of land are appropriate, but consideration should still be given to flooding from other sources as well as from river and sea. Their effect on surface water runoff should also be addressed.	→
<b>2</b> <b>Medium Probability</b> Annual probability of flooding: River 0.1 - 1.0% Tidal and coastal 0.1 - 0.5%	→	The water compatible, less vulnerable and more vulnerable uses of land and essential infrastructure are appropriate in this zone.	The Exception Test be carried out for the highly vulnerable land uses.
<b>3</b> <b>High Probability</b> Annual probability of flooding, with defences where they exist: River 1.0% or greater Tidal and coastal 0.5% or greater	a	The water-compatible and less vulnerable uses of land are appropriate in this zone.	Highly vulnerable and essential infrastructure should only be permitted if the Exception Test is passed.
	b Functional Floodplain	The water-compatible and less vulnerable uses of land are appropriate in this zone. The less vulnerable and highly vulnerable uses should not be permitted in this zone.	Water-compatible and essential infrastructure should only be permitted if the Exception Test is passed <b>and</b> design and construction adheres to the specific guidance given.

Undertake flood risk assessment and consider climate change and surface runoff increase Proceed to allocation



1.1.2 The main objective of the Sequential Test is to enable a local planning authority to assess flood risk and allocate all development in Zone 1. If this cannot be achieved, the objective will then be to allocate development to available sites in areas of lowest risk, which would be appropriate to the type of development or land use proposed.

## 1.2 Levels 1 and 2 Assessments

1.2.1 SFRA's are required at a level appropriate to the Local Development Document under consideration. A Level 1 SFRA (as defined in the Companion Guide to PPS25) identifies the main flood risk zones across a plan area, including allocated sites and investigates the implications of climate change. After the sequential test has been initially undertaken assuming no defences in place, a Level 1 assessment also takes into account the implications of existing flood risk management infrastructure (flood warning systems, raised defences, etc).

1.2.2 LDD policies are required to set out the circumstances in which individual site-specific flood risk assessments are required. As part of a Level 1 SFRA, guidance is provided on the preparation of flood risk assessments for specific sites and the applicability of sustainable drainage systems.

1.2.3 Where it proves impossible to avoid development in areas at risk of flooding (for example in existing built-up areas), a Level 2 of SFRA is required, which provides the more detailed information necessary for application of the Exception Test. This takes into account the beneficial effects of flood management infrastructure, and involves mapping of flood outlines for different probabilities, impact, speed of onset, depth and velocity variance of flooding, as well as the likely performance of the flood management infrastructure.

## 1.3 Main Project Requirements

1.3.1 The main project requirements are:

- a) Produce a plain English executive summary of the main findings of the SFRA that can be understood by members of the public.
- b) For all work to be compliant with the latest guidance and best practice prevailing at the time of the study including PPS25, the draft Development and Flood Risk Practice Guide Companion to PPS25, and advice from the Environment Agency.
- c) Secure Environment Agency agreement on SFRA methodology.
- d) Draft report submitted by the end of May 2007 and a final report to be prepared and agreed with the Environment Agency by the end of July 2007.

- e) If required, give evidence in support of the technical work at the examination into any objections to the Local Development Framework documents (subject to separate instructions and payment). The consultant is expected to ensure that no conflict of interest is likely to arise between the completion of the study and the anticipated date of the Core Strategy examination.

#### **1.4 Specific Project Requirements**

1.4.1 The specific requirements are as follows:

1.4.2 For the Level 1 SFRA (as defined in the Companion Guide to PPS25) to:

- i. Map existing Flood Zones 1, 2 and 3 across the plan area;
- ii. Map Flood Zones 1, 2 and 3 for the future climate change scenario of 2115 as set out in PPS25 Annex B, taking account of recommended contingency levels for sea level rise, and recommended national precautionary sensitivity ranges for peak rainfall intensities, peak river flows, off-shore wind speeds and wave heights;
- iii. Identify areas at risk from flooding from sources other than rivers and the sea;
- iv. Identify and take into account flood risk management measures including flood defences and emergency warning systems;
- v. Identify locations where development would significantly increase the risk of flooding elsewhere.

1.4.3 For the Level 2 SFRA (subject to the findings from the Level 1 SFRA):

- i. Undertake river modelling at locations where the Exception Test is required;
- ii. Advise on the potential adverse and beneficial effects of flood risk management infrastructure including raised defences, flow channels, flood storage areas and other artificial features together with the consequences of their failure;
- iii. Provide guidance on the preparation of Flood Risk Assessments for Level 2 SFRA allocated development sites;
- iv. Provide guidance on possible mitigation including the likely applicability of different sustainable drainage systems (SUDS) techniques for managing surface water run-off at key Level 2 SFRA development sites.

**1.5 Project Outputs, Output Materials and Outcomes**

1.5.1 The main output will be a Strategic Flood Risk Assessment Report (maximum 15 pages for the main text). It will provide an overview of methodology, mapping and references to GIS tools. This will be provided as two hard copies and four CDs.

1.5.2 Halcrow will report to the Client at key development stages of the study.

1.5.3 The report will be written to be understandable for those who will be reading it and auditable for those who will be checking it. Assumptions and uncertainties will be well documented.

## 2 STUDY METHODOLOGY

### 2.1 Strategic Approach

2.1.1 Our strategic approach is based on excellent technical experience in the key fields of Water, Planning and the Environment and the ability to work harmoniously across these disciplines. Our over-arching aim as a company is to “Sustain and Improve the Quality of People’s Lives”.

2.1.2 Key points of our strategic approach:

- a) Technical Excellence – underpinning our ability to make swift, thoughtful and Client focused recommendations is our key role in technical excellence in the fields of Project Management, Flood Risk, Planning and the Environment.

We are aiming at producing outputs of exemplar practice while using ‘lean’ project management techniques to keep budget and programme under control. We will for example, frequently update a fully resourced programme to ensure full monitoring of work in progress.

- b) Using best practice in consultation – consultation will be very important throughout the development of the SFRA.

<p><b>Best practice in consultation: SEA of the Broadlands Flood Alleviation Scheme</b></p> <p>Halcrow, working in a joint venture with Edmund Nuttall Ltd for delivering flood defence improvements in the Norfolk Broads under a PFI contract to the Environment Agency.</p> <p>Halcrow is working to deliver a range of structural and non-structural flood defence solutions within the strict planning controls of a National Park and Natura 2000 site.</p> <p>The first two years of the project involved the development of a comprehensive planning strategy and SEA in consultation with over 1000 stakeholder organisations and individuals. The project was praised for its innovative use of communication strategies including stakeholder meetings, surgeries and site visits, ‘user friendly public documentations and feedback forms.</p>	
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- c) Understanding of current and previous studies and modelling work, local issues and data availability. We are for example proposing to use the same resources that have been working on the Hampshire County Council SFRA.

- d) Understanding Your Needs – we believe that the most important element of delivering a successful project is building and maintaining an excellent working relationship with the Client and other important stakeholders. By listening and understanding from the outset we shall adapt the approach we take as the assessment progresses to ensure a timely and successful end product.
- e) Our commitment – We are very enthusiastic about the prospect of delivering this high profile project and will be fully committed to successfully deliver the project to high quality, on time and on budget.

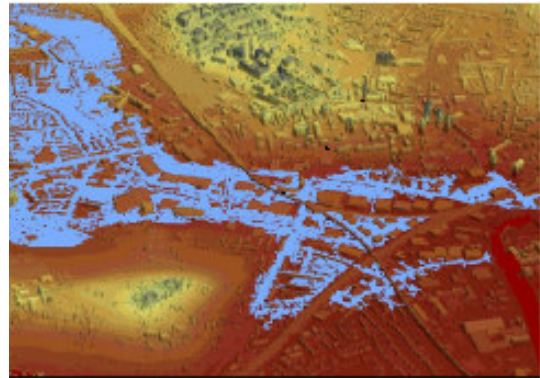
**2.2 General Methodology**

2.2.1 The SFRA will take into account of PPS25, its recently published Companion Guide and advice from the Environment Agency. This proposal refers to a Level 1 SFRA as the full extent of the Level 2 SFRA can only be known as a result of the Level 1 assessment.

2.2.2 The SFRA will take account of all types of flooding. Hydraulic modelling work is not anticipated for the Level 1 SFRA as there is sufficient information available (from historic events, local knowledge and previous studies) from a number of sources.



Example of 2D TUFLOW modelling



3D plot of 2D modelling through an urban area

2.2.3 We will fully comply with all project requirements of **Section 1.3.1**. The technical work will be appropriate for the purpose that is required and it will not involve unnecessary and unrelated detail and assessments.

## 2.3 Data Gathering and Quality of Information

2.3.1 The source of data for the Level 1 SFRA will be the Environment Agency, our Halcrow Library, a number of relevant websites, the Local Planning Authorities, Hampshire County Council, Southern Water and the PUSH Authorities. Halcrow has collected most of this information as part of the Hampshire County Council SFRA.

2.3.2 Our main approach is to build on the large number of strategic studies and data from the Hampshire County Council SFRA, the PUSH study, the relevant CFMPs and historic flooding information from a number of sources. Although the CFMPs in Hampshire are not yet complete, the Scoping stages are completed and these hold relevant information that will inform the SFRA.



2.3.3 All incoming data will be recorded on a project data register by a specialist document controller/GIS data manager, specifically designated for this project. This will include such details as data source, date of publication/production, format (file/document type and if it is in electronic or hard copy format) and the location of the received data.

2.3.4 The quality review of the additional information will be carried out by an experienced core team. The team will be able to review effectively the collected data, assess its significance, its quality and advice on which part of the collected data needs to be used for the SFRA.

2.3.5 A summary of the required information is given below:

- Digital format mapping
- General topography
- Areas with flood warnings/emergency planning
- Zone 3 fluvial boundary and delineation within this boundary
- Zone 3 tidal or coastal boundary and delineation within this boundary
- Zone 2 boundary
- Areas with flood management strategies
- LiDAR digital elevation data (a review of the available LiDAR data has revealed that there is a large coverage within Hampshire).

- Defence information and standard of protection where available. The Environment Agency holds information on the designation, condition and design standard/levels of all its defence structures on the National Flood and Coastal Defence Database (NFCDD).
- Environmental and geographical datasets, such as river centrelines for main rivers and ordinary watercourses
- Historical evidence of flooding. This would include recorded levels, flood outlines, photographs, questionnaire responses and flood history databases.
- Further anecdotal/specific information on a variety of subjects, to include likelihood of breach scenarios, known flood flow routes and maintenance issues.

**2.4**

**Inception Meeting**

2.4.1

An Inception meeting with Winchester City Council is proposed, as soon as the Contract is awarded. Following the Inception Meeting we will produce: a) a communication plan, b) a list of the information already collected and c) a request to provide further strategic data. It is recommended that the Environment Agency attends (including other key meetings) for the achievement of best practice at various stages in the project.

**2.5**

**Level 1 SFRA**

2.5.1

Requirements i. to vi. of the Level 1 SFRA will be achieved as follows:

- i. Flood maps are already available from the Hampshire County Council SFRA. The only task will be to print a copy that does not include minerals and waste sites and a further copy for the report, once the Sequential test has been undertaken by the local planning authority.
- ii. For a Level 1 SFRA, the ‘Climate Change’ Flood Zones along the fluvial reaches will be assumed as:
  - ‘Climate Change’ Functional Flood Plain = Current Flood Zone 3
  - ‘Climate Change’ Flood Zone 3 = Current Flood Zone 2
  - ‘Climate Change’ Flood Zone 2 = Current Flood Zone 2 (as there is very little certainty about the effect that Climate change will have on very extreme events).

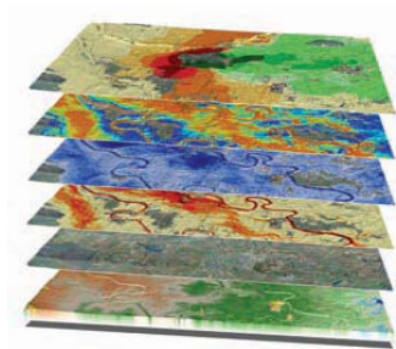
- iii. Most sources of flooding have been investigated as part of the Hampshire County Council SFRA. The only remaining tasks will be to obtain additional information about reservoirs and to review (by the Client and by Halcrow) our current GIS data in relation to flood pathways.
- iv. Information about current flood risk measures can be easily obtained from the Environment Agency for the main rivers. Flood risk measures from other sources of flooding will be identified and information obtained.
- v. We will identify locations where flood risk could increase significantly elsewhere as a result of the development proposals. The purpose is not to eliminate areas from development but to highlight that major SUDS proposals will be required at those locations. The proposals could involve the use of 'green roofs' for rainfall harvesting and re-cycling rainfall runoff for flushing toilets, etc.
- vi. We recommend that the final report provides guidance on possible mitigation measures, including the likely applicability of different sustainable drainage systems (SUDS) techniques for managing surface water run-off at key Level 1 SFRA development sites. This is important as a consistent approach is required in order to facilitate the planning process.

## 2.6

### Preparation of Strategic Flood Risk Maps

#### 2.6.1

The strategic flood risk maps will be presented in GIS form as layers (and associated descriptive information) together with OS base maps and layers of watercourses. The GIS layers will contain audit trail information such as source, date, originator, etc.



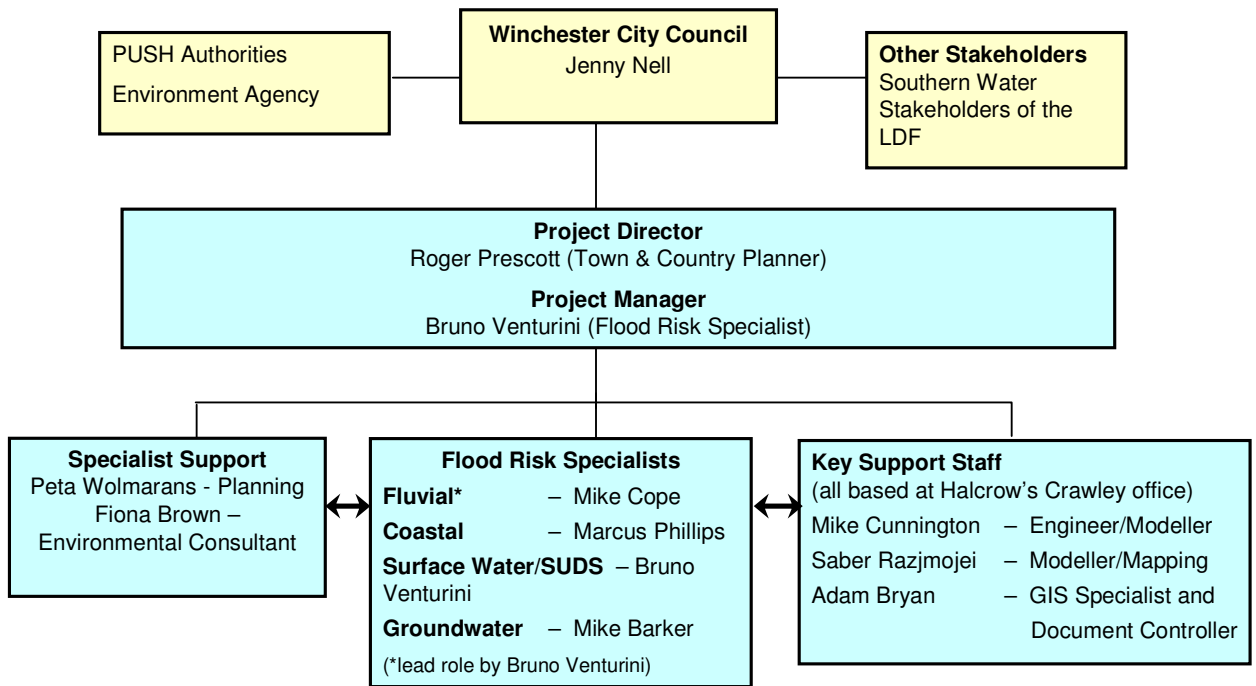


### 3 PROJECT TEAM

#### 3.1 Project Organisation

3.1.1 The project team members are all full-time Halcrow employees, principally drawn from the Water & Utilities Business Group. The strength of this group currently stands at over 700 professional and technical staff in the UK. With this large number of staff at our disposal, we are able to adjust personal workloads to match assignments.

3.1.2 An organogram of our proposed project team is presented below.



3.1.3 Halcrow pledges that the core team (Mike Cunnington and Adam Bryan) will be solely dedicated to this project.

3.1.4 Further details of the project team, including their proposed role in this commission and activities are given on the next page and in staff biographies (Section 3.3). Full staff CVs can be provided on request.

### 3.2 Key Staff

Name	Job Title	Role in this Commission	Activities
Roger Prescott	Director	Project Director	Oversee Halcrow-Client relationship and commission delivery, and high level representation for project. Environmental Planning overview.
Bruno Venturini	Principal Engineer Flood Risk Specialist	Project Manager Specialist in strategic fluvial and urban flood risk assessment	Establish, lead and manage the project process, including programme/cost control, and consultation. Fluvial flood risk assessment
<b>Specialist Support</b>			
Peta Wolmarans	Associate Director	Development planning assessment	Advice on Sequential Test and Exception Test
Fiona Brown	Environmental Manager	Link to Sustainability Appraisal	Advice on environmental impacts and enhancements
<b>Flood Risk Specialists</b>			
Mike Cope	Flood Specialist	Specialist in Catchment Flood Management Plans	Project link to CFMPs (Mike is project manager for New Forest, Test & Itchen and Hampshire Avon) and South Hampshire CFMP team.
Marcus Phillips	Coastal Engineer	Specialist in Shoreline Management Plans	Coastal flood risk assessment.
Mike Barker	Hydrogeologist	Specialist in groundwater flooding	Groundwater flood risk assessment
<b>Support Team</b>			
Mike Cunnington	Graduate Engineer	General project support in developing this SFRA	Data collection, flood risk assessment and reporting
Saber Razjmojei	Modeller/Mapping	River and Coastal modeller	Interpretation of Modelling outputs Hydraulic Modelling
Adam Bryan	GIS Analyst	GIS and Document Controller	GIS work and production of maps. Document controller and general support to Project Team, specially nominated to ensure compliance with our Quality Assurance system.

### 3.3 Biographies of Key Staff

3.3.1 Provided below are ‘thumbnail’ biographies of the key staff:

#### 3.3.2 **Project Director – Roger Prescott, BSc (Hons) MBA MRTPI FRGS**

Roger Prescott has 34 years experience as a planner, including local experience with 21 years with Hampshire County Council and 13 years in the private sector. Roger expertise ranges from Environmental Impact Assessment – submissions and reviews, development control – submission of planning applications and pre- and post-submission negotiation, public enquires, planning for fluvial and costal flood risk management, sustainable development including renewable energy.

When working for Hampshire County Council, he was project manager of a large urban regeneration programme. This included a capital programme of nearly £2M per annum for Portsmouth, Southampton, Gosport, Aldershot and Eastleigh, seeking environmental improvements to facilitate economic and social investment. Roger drew up programmes and supervised project managers, ran participation exercises and liased with landowners. Many improvements were to MOD sites, and included close liaison to ensure cultural heritage of sites was not infringed. These included Cambridge Military Hospital, Beaumont Barracks West Park, Southampton and Prince Consort's Library, Aldershot; Military Hospital, Haslar and HMS Alliance, Gosport; and Royal Marines Museum and Clarence Ground recreation area, Portsmouth. Schemes included a number of new schemes for public art.

#### 3.3.3 **Project Manager – Bruno Venturini, CEng MICE Eur Ing**

Role/responsibilities: to lead and manage the project process, provide overview and direction, liaise and report to the Client, liaise with stakeholders, and also take a lead role in the assessment of fluvial and surface water flood risk.

Bruno Venturini is a specialist in flood risk assessment, with over 17 years of professional experience. Bruno is also Market Sector Manager for Halcrow’s Water Resources, Planning, Modelling and Hydrology team for the Southern Region. He has carried out and reviewed over fifty strategic flood risk assessments and detailed flood risk assessments, and has 10 years experience in SUDS. His recent experience includes project managing the £122,000 River Ravensbourne South London strategy study for the Environment Agency (project completed on time and budget).

Bruno has also represented Halcrow in the preparation of PPS25, and is responsible for the dissemination of flood risk planning information across the company (for example recent guidance from the FLOWS - Floodplain Land Use Optimising Workable Sustainability project).

3.3.4 **Environmental Planner – Peta Wolmarans, BSc CEng MICE ACGI**

Peta Wolmarans, BscSc (Hons) MCRP

Peta is an Associate Environmental Planner with Halcrow with 10 years experience, including Strategic Planning, Environmental Impact Assessment, Strategic Environmental Assessment (SEA) and development planning. Peta was recently Project Director for the Sustainability Appraisal of the Milton Keynes Minerals Local Plan. Areas of particular interest are water and the coastal environment. She was involved in the Strategic Environmental Assessment of future development options in Ashford, a designated growth area in the South East of England.

She has been involved in a range of studies with environmental impact assessments, including the Channel Tunnel Rail Link, Stansted Airport Extension, the A303 (Stonehenge) project and water infrastructure developments. Peta was recently Project Manager for the preliminary SEA of the London Mayor's Revised Transport Strategy. She provided key inputs into the European Commission funded project examining the key components of SEA, considering international best practice in SEA and the integration of the environment in strategic decision-making.

3.3.5 **Environmental Manager – Fiona Brown**

An Associate Director of Halcrow, Fiona Brown is based in the Environment Team in the London Office and has 25 years' experience of environmental assessments in the UK and overseas. She is a specialist in the environmental impact assessment (EIA) and management (EMS) of transport infrastructure projects, and has project managed road, rail and airport studies.

Under the new strategic environmental assessment (SEA) process enshrined in EC Directive 2001/42 and other legislation, Fiona has recently completed the SEA for the Hampshire Minerals and Waste Development Framework. Previously Fiona carried out a Strategic Environmental and Social Assessment for the National Tourism Strategy in Montserrat, a UK Overseas Territory, for DFID, the SEA of the District Council Plans in Mauritius, and SEAs for the Barbados Physical Development Plan and the Mauritius National Development Plan.

3.3.6 **Specialist in CFMPs – Mike Cope, BSc (Eng) CEng MICE**

Role/responsibilities: to provide specialist input based on experience developing Catchment Flood Management Plans, provide the link to the other CFMP team for South Hampshire and guide the flood risk assessment.

Mike Cope has over 18 years experience of river related studies, with extensive experience both at a strategic level and in scheme development. His work has included flood alleviation strategies within multi-disciplinary teams and assessments of many developments proposed in floodplain areas. He specialises in regional flood risk assessments and long-term strategic planning, with ongoing projects including the New Forest, and Test and Itchen Catchment Flood Management Plans, and strategic studies in the lower Thames catchment.

3.3.7 **Coastal Engineer – Marcus Phillips, BSc MEng CEng MICE**

Role/responsibilities: to provide specialist input based on recent experience on Shoreline Management Plans, and guide the flood risk assessment in coastal areas.

Marcus Phillips is a senior coastal engineer with over ten years experience in the development of coastal schemes, coastal strategy studies and Shoreline Management Plans. He has extensive experience in assessing coastal processes, existing defences and in the identification, development and evaluation of sustainable coast defence solutions and whole life costing. Recent projects include project managing the Portchester Castle to Emsworth Strategy and the Hayling Island Coastal Strategy for the Environment Agency and local authorities.

3.3.8 **Hydrogeologist – Mike Barker, BSc MSc**

Role/responsibilities: to provide specialist input on groundwater flooding issues.

Mike Barker is Principal Hydrogeologist with 18 years experience. Mike has worked extensively on groundwater resources projects both in the UK. As an expert in flood risk assessments arising from groundwater, he brings to this commission his local knowledge from the Hampshire Groundwater Flooding Study (2001) for the Environment Agency. Mike is also a Technical Reviewer on the Making Space for Water research project to develop a risk management approach.

3.3.9 **Graduate Engineer – Mike Cunnington, MEng Hons**

Mike joined Halcrow in 2005 and since then he has carried out flood mapping work, flood risk assessments, flood forecasting modelling, hydrology and river modelling (1D and 2D). Before joining Halcrow, Mike's university studies specialised in flood risk management.

3.3.10 **River and Coastal Modeller – Saber Razmjooei, Civil Engineer**

Saber Razmjooei is the technical leader of the Water Management modelling team based at Halcrow's Crawley office. He was project package manager and specialist in 2D TUFLOW river modeller for the Avonmouth and Severnside Area SFRA (for the Bristol City Council, South Gloucestershire Council and Lower Severn Drainage Board) when working for Capita Symonds. Saber has managed and provided specialist input in 1D and 2D river modelling work in more than twenty flood risk assessments and flood risk management projects.

3.3.11 **GIS Analyst – Adam Bryan, BSc (Joint Hons), MSc**

Adam is a GIS analyst, proficient in the use of GIS software including MapInfo, Vertical Mapper, ArcView, ArcGIS and NFCDD. He has six years experience and has been with Halcrow for nearly a year. During this time he has been instrumental in the creation of flood outlines for the Environment Agency flood maps. Adam has also worked on National Major Flood Exercises, and is experienced with the JFlow modelling package. He also produced a generation of maps and prepared GIS data to be used for the exercises.

Adam has also been fully involved in the Halcrow Group Business system and project level and at Office Level to ensure compliance when audited.

**3.4 Lines of communication**

3.4.1 It will be important for this project to have clear lines of communication. Equally it is important to ensure that the flow of information between parties is efficient and does not duplicate work. The key contacts will be the project managers from Winchester City Council and Halcrow.

3.4.2 A communication plan will be jointly agreed at the Inception meeting.

3.4.3 A Project Information Register will be set up and maintained by the document controller.

## 4 SKILLS & EXPERIENCE

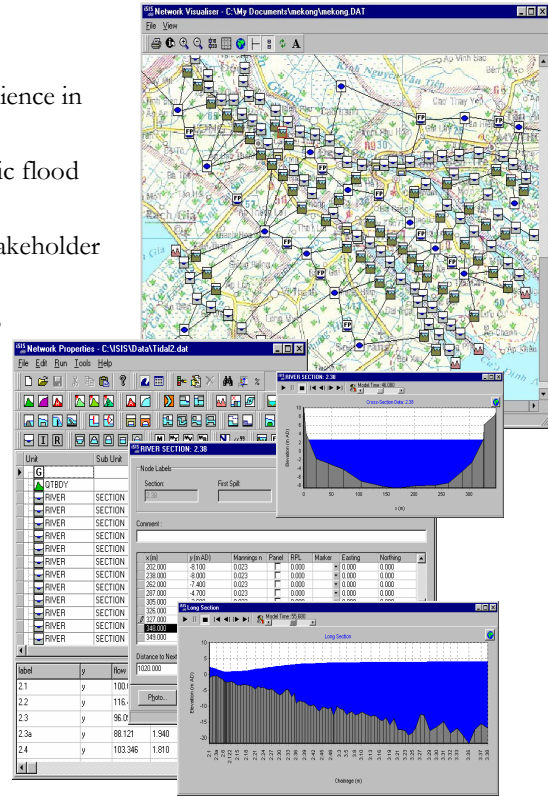
### 4.1 Halcrow Group Ltd

4.1.1 Halcrow has proven resources and expertise to undertake the full range of flood risk assessment projects. Previously completed projects within the Hampshire area demonstrate our capability to produce cost effective solutions and to manage projects from concept to commissioning efficiently and with time and budget restraints.

4.1.2 We would highlight in particular:

- our local knowledge and experience in the South East Region
- our strong capability in strategic flood risk assessments
- our effective engagement in stakeholder consultation
- our extensive capability in GIS work

4.1.3 Examples of our strategic flood risk assessment work are indicated below, with particular reference to recent work within Hampshire that shows the breadth of our relevant experience and expertise for this commission.



### 4.2 Details of Similar Work and Our Effectiveness

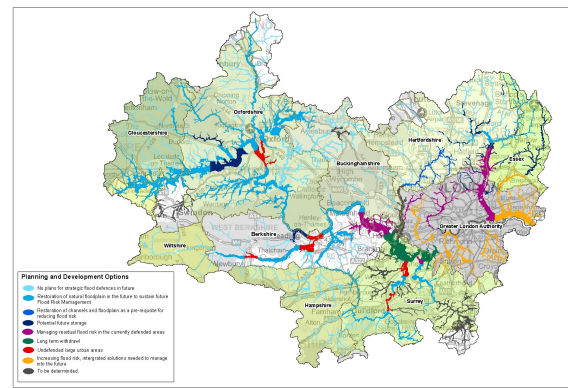
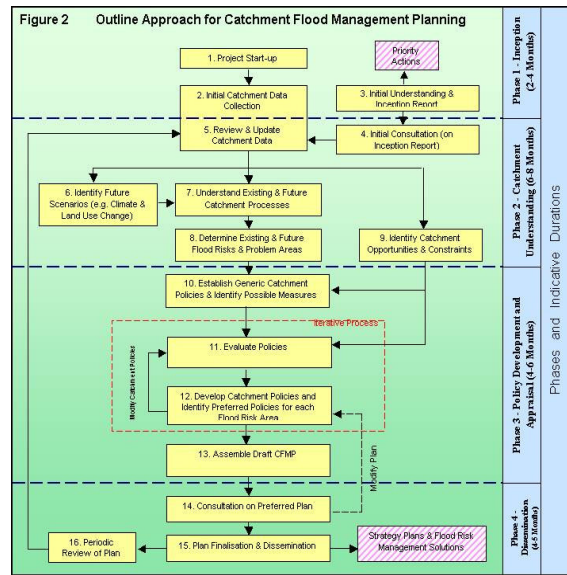
4.2.1 We have a very large practice in UK Flood Management and currently undertake flood defence and coastal studies and engineering designs for a large proportion of the national capital programme for flood defence in England and Wales.

4.2.2 Halcrow are developing Catchment Flood Management Plans (to identify policy) within Hampshire for the Environment Agency. Our work is promoting sustainable approaches to flood management, including ‘Making Space for Water’ initiatives through integration with land use planning and the consideration of non-structural (non-engineering) options.

4.2.3 We have developed guidelines on behalf of the UK Department of the Environment, Farming and Rural Affairs (DEFRA) and the Environment Agency in the UK for formulating integrated Catchment Flood Management Plans and Shoreline Management Plans, designed to develop sustainable flood defence policies and strategies.

4.2.4 Our previous experience and successful delivery of similar studies in the past few years includes recent flood work for regulatory and other parties in the UK:

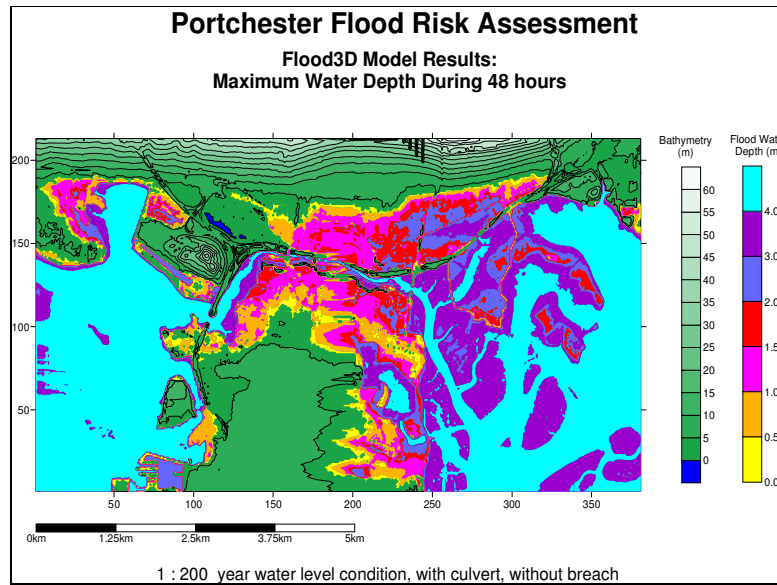
- Strategic Flood Risk Management Framework for Environment Agency (2003-2008)
- NEECA Framework on Flood & Coastal Defence for Environment Agency (1996-ongoing)
- National Flood Risk Assessment, NaFRA, for Environment Agency (2002-ongoing) and Foresight Project in Flood and Coastal Defence for Office of Science and Technology (2003–2004)
- Preparation of Catchment Flood Management Plan and Shoreline Management Plan Guidelines for Environment Agency/Defra (2002-ongoing), and 13 Catchment Flood Management Plans for Environment Agency (2003-ongoing)
- 8 Flood Risk Management Strategies for Environment Agency (2003-ongoing)
- Many flood risk assessments for public and private clients



4.2.5 Halcrow are assisting the Environment Agency in developing Catchment Flood Management Plans (CFMPs) to develop sustainable long-term (100 years) flood risk management policies. Our work involves close collaboration with other authorities, with strong links to the wider planning framework. We are currently developing two CFMPs that fall within the study area – the New Forest and Test & Itchen.



4.2.6 Of the relevant coastal experience highlighted in this section, the primary importance for this study is the work that has been carried out for the strategy studies for Portsea Island, Portchester Castle to Emsworth, and Hayling Island. As a result of undertaking these studies, Halcrow has a very good knowledge of the area and the driving forces behind flood risk along these coastal areas, including the complex interaction of waves and tides both along the open coast and within Portsmouth and Langstone Harbours.



4.2.7 Halcrow also has a good understanding of the possible flood and coastal defence options that could be implemented in these areas, having assessed a range of possible options as part of these studies.

4.2.8 In undertaking these previous studies, Halcrow established a numerical coastal model for the eastern Solent, and this model could be readily extended in the future to include the western Solent and Southampton Water in order to provide assessment of the coastal forcing factors of relevance to flood risk in this part of Hampshire. To extend the model, additional bathymetry data and calibration (recorded tide level and flow data for example) would be required.

4.2.9 Halcrow carried out the winter 2000 groundwater and fluvial flooding assessment for the Environment Agency. This project reviewed the extent, causes, hydrological context and potential mitigation measures for flooding incidents at over 100 separate villages in Hampshire. Our work included wide consultation, and separate reporting for each Parish affected.

4.2.10 We have an extensive and experienced team of GIS and software developers who have been working on flood mapping solutions since the mid 1990s.



4.3

**Relevant Experience for Public Clients**

4.3.1

Relevant projects to this commission are summarised below:

Project Type	Projects
Relevant Catchment Flood Management Plans	<ul style="list-style-type: none"> <li>• New Forest Catchment Flood Management Plan</li> <li>• Test &amp; Itchen Catchment Flood Management Plan</li> </ul>
Coastal Flood Risk Assessment	<ul style="list-style-type: none"> <li>• Portsea Island Coastal Strategy Study</li> <li>• Hayling Island North: Sectoral Strategy Study</li> <li>• Hengistbury Head: Consequences of Flooding</li> <li>• Portchester Castle to Emsworth Strategy Study</li> <li>• Colne &amp; Blackwater Estuary Flood Management Strategy Study</li> <li>• Roach &amp; Crouch Flood Management Strategy</li> <li>• Thames Estuary 2100 Flood Risk Management Strategy</li> <li>• Humber Estuary Flood Risk Management Strategy</li> <li>• National Guidance for Shoreline Management Plans</li> <li>• FutureCOAST project for Defra</li> </ul>
Strategic Flood Risk Assessments	<ul style="list-style-type: none"> <li>• Hampshire County Council SFRA (minerals and waste)</li> <li>• SFRA for Haringey Borough Council (inception stage)</li> <li>• Corby Water Cycle Strategy ( incorporates SFRA for allocation of future development and regeneration of the Town Centre)</li> <li>• Swindon Water Cycle Strategy (ongoing)</li> <li>• Milton Keynes and South Midlands SFRA (development planning for Milton Keynes &amp; South Midlands development area)</li> <li>• Kent Thameside SFRA (formal review by Halcrow)</li> <li>• East London SFRA (formal review by Halcrow)</li> </ul>
Catchment Strategies	<ul style="list-style-type: none"> <li>• Hampshire Flooding</li> <li>• River Ravensbourne Flood Strategy</li> <li>• Lower Lee Flood Strategy (ongoing)</li> <li>• Upper Colne Flood Defence Strategy (2002)</li> <li>• Upper Lee Flood Defence Strategy (2002)</li> <li>• River Kennet Catchment Flood Strategy (2005)</li> </ul>

**4.4 Strategic Flood Risk Studies**

4.4.1 Halcrow’s previous experience of relevance to this study is as follows:

4.4.2 **National Flood Risk Assessment** - Since 2004 Halcrow has led the Environment Agency’s National Flood Risk Assessment (NaFRA) project which is evaluating the probability of flooding at all points within the floodplain accounting for the presence of flood defences. NaFRA supports Defra and the Welsh Assembly in their bids to HM Treasury for funding, and their allocation of funding to regions and areas to deliver actions to reduce flood risk, focusing on the locations in greatest need.

4.4.3 The first National Flood Risk Assessment (NaFRA) covering the whole of England and Wales developed a new method called Risk Assessment for Strategic Planning (RASP). RASP is a tiered approach that enables us to undertake flood risk assessments to support decision making at different spatial scales.

4.4.4 **CFMPs** – Halcrow developed the CFMP Guidelines.

4.4.5 **New Forest CFMP** (scoping stage completed this year) – This catchment is relatively short and steep, the larger ones emerging from the forest National Park to the south coast at the Solent (e.g. Lymington, Beaulieu, Danes Stream, Avon Water) or to Southampton Water (Bartley Water).

4.4.6 Causes of flood risk include a significant number of local drainage issues, though fluvial flooding is the primary source concentrated in Totton, Lymington and Brockenhurst, plus Keyhaven and Milford-on-Sea when combined with an extreme tide condition. There are some flood risks also in smaller settlements, particularly Beaulieu.

4.4.7 We estimated the economic damages due to flooding at average £3million per year in the catchment, including tidal flood risk at the river mouths, with approximately 1,500 properties at risk.

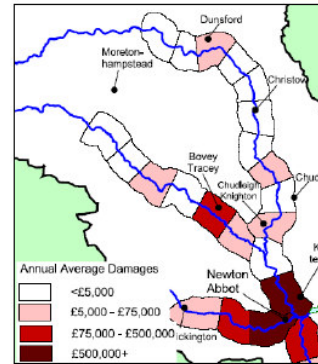


4.4.8 **Test and Itchen CFMP** (scoping stage completed this year) – This CFMP considers the combined catchments of the Rivers Test and Itchen.

4.4.9 The catchments are relatively flat and low-lying, emerging from the permeable chalk downs to the north as ephemeral streams. These soon become classic chalk rivers with high water quality mostly fed by groundwater.

4.4.10 Causes of flood risk are diverse, including significant groundwater influence, though fluvial flooding is the primary source of flood risk, concentrated in Romsey, Winchester, Andover, Eastleigh and Bishopstoke, with further dispersed flood risks through the rural villages. We estimated the economic damages due to flooding at £7million per year in the catchment, with over 3,000 properties at risk.

4.4.11 **Strategic Flood Risk Assessments for Milton Keynes and South Midlands SFRA** – Halcrow is providing SFRA inputs to the development planning process for the Milton Keynes and South Midlands development area. The objective is to assess the impacts and risks associated with major increases in population and associated house and infrastructure building. Bruno Venturini is responsible for the strategic flood risk assessment of the study.



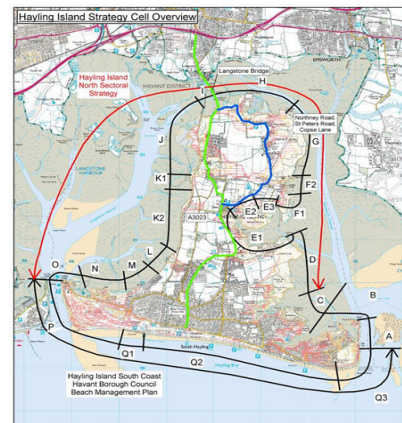
4.4.12 Halcrow undertook a strategic review of the planned development in the Milton Keynes South Midlands growth area on behalf of the Agency in order to identify water cycle issues that could prevent the development aspirations of the office of the deputy prime minister being realised. The study required the interpretation of planning documents, identification of water cycle issues, including flood risk and proposals for their resolution.

4.5 **Coastal Strategy Projects**

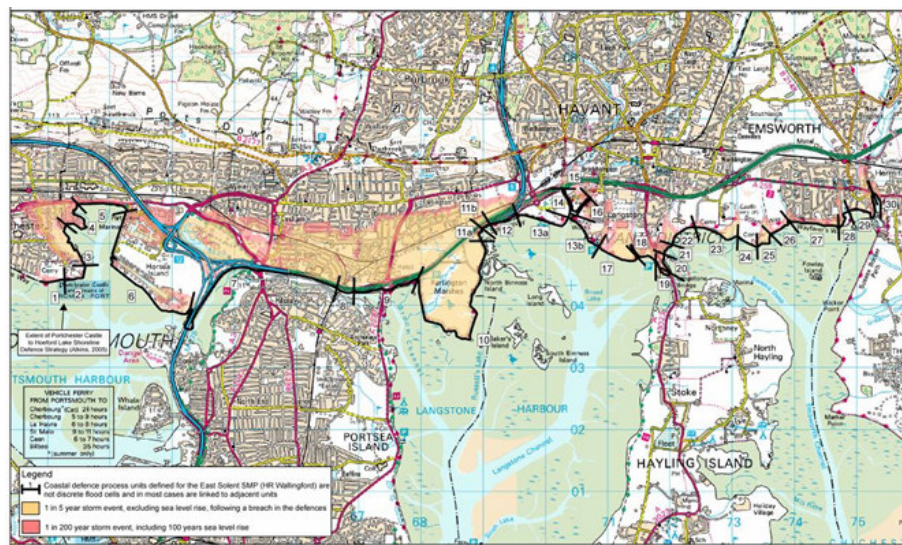
4.5.1 Halcrow’s previous experience of relevance to this study is as follows:

4.5.2 **Portsea Island Coastal Strategy Study** – Halcrow was appointed by Portsmouth City Council in 2001 to undertake stage 2 of the Portsea Island Coastal Strategy Study. The initial stages of the study involved reviewing the scoping study document and addressing the issues that it raised.

4.5.3 Following on from this, the study assessed the environmental and economic baseline conditions, updated the existing flood and coastal defence condition report, considered coastal change by reviewing conclusions drawn from previous studies and work carried out specifically for this strategy study, and assessed the extent of flood damages over a 100-year planning horizon.



- 4.5.4 Information received from these studies was used to develop suitable options for the continued management of the existing shoreline to ensure the adoption of an environmentally and economically sustainable solution. Client: Portsmouth City Council.
  
- 4.5.5 **Hayling Island North: Sectoral Strategy Study** – Developing a flood risk strategy for the low-lying north coast of Hayling Island to identify areas where flood defence improvements are required.
  
- 4.5.6 **Hengistbury Head: Consequences of Flooding** – Study assesses the flood risk to assets in Christchurch Harbour under a scenario of no breach at Double Dykes and estimates the flood risk to assets if instead the breach at Double Dykes did occur.
  
- 4.5.7 **Portchester Castle to Emsworth Strategy Study** – Developing a strategy for the coastline between Portchester Castle and Emsworth along the northern (mainland) coastline of Portsmouth Harbour, Langstone Harbour and Chichester Harbour, to close the gap in existing strategies.



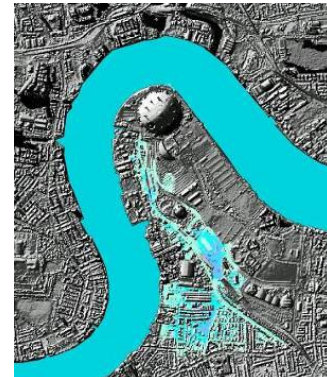
- 4.5.8 **Colne and Blackwater Estuary Flood Risk Management Strategy Study** – The overarching aim of this strategy is to promote sustainable flood management schemes and regenerate coastal habitat in the Colne and Blackwater estuary complex, whilst managing flood risk and delivering economic and environmental benefits over the next 100 years.

4.5.9 The strategy considers the impact of the existing flood defences on the natural development of the whole estuary complex through the application of innovative techniques and sets out the most economically viable, environmentally acceptable and hydrodynamically sustainable flood management options. The strategy will also include a short-term implementation plan for the preferred flood management schemes in the first five years of the strategy.

4.5.10 **Roach & Crouch Flood Management Strategy** – The overarching aim of this strategy is to promote sustainable flood management schemes and regenerate coastal habitat in the Roach and Crouch estuary complex, whilst managing flood risk and delivering economic and environmental benefits over the next 50 years.

4.5.11 The strategy considers the impact of the existing flood defences on the natural development of the whole estuary complex through the application of innovative techniques and sets out the most economically viable, environmentally acceptable and hydrodynamically sustainable flood management options. The strategy also includes a short-term implementation plan for the preferred flood management schemes in the first five years of the strategy.

4.5.12 **Thames Estuary 2100 Flood Risk Management Strategy (TE2100)** – Halcrow has been helping to deliver a plan for flood risk management in London and the Thames Estuary for the next 100 years. The area is low-lying, densely populated and of critical importance to the economic well-being of the UK.



Climate change, development pressures and ageing flood defence infrastructure all contribute to an increase in the future potential for flooding and its consequences.

The TE2100 Plan is addressing these issues. Halcrow has provided strategic advice on development of the TE2100 plan and undertaken a range of supporting technical studies.

4.5.13 **Humber Estuary Flood Risk Management Strategy** – The 235km of tidal defences around the Humber Estuary protect the homes of more than 300,000 people and assets valued at more than £7 billion. Halcrow, in alliance with Black and Veatch, developed a strategy for managing the defences over the next 100 years, including defence improvement, managed realignment, monitoring and maintenance. Halcrows' principal work comprised the preparation of 8 key issue assessments and 5 detailed appraisals. The strategy was completed in July 2005.

4.5.14 **Eastoke Beach Renourishment Scheme** – This scheme aims to reduce coastal erosion and flood risk to the residents of Eastoke, with a target standard of protection of 1:200-years. The study was completed in 2005. Client: Havant Borough Council

- 4.5.15            **National Guidance** – Halcrow has developed the guidance for undertaking the second generation of Shoreline Management Plans, including carrying out 3 pilot SMPs to demonstrate this guidance. Prior to developing the SMP2 guidance, Halcrow also led the FutureCOAST project, that sought to provide information on long-term coastal evolution to inform the SMP2 process. Client: DEFRA
  
- 4.5.16            **Shoreline Management Plans** – Halcrow has prepared many SMPs around the English coast, and this includes the West Solenand Southampton Water SMP.
  
- 4.5.17            **Preparing for the Impacts of Climate Change** – This study was commissioned by the Standing Conference on Problems Associated with the Coastline (SCOPAC), a Regional Coastal Group for central southern England. Its main aim was to inform shoreline managers and others of the likely impacts of climate change on this region, and the resulting implications for future management.

## **5 PROJECT EXECUTION**

### **5.1 Programme**

5.1.1 A project programme (MS Project) will be presented at the inception meeting.

### **5.2 Progress Reports**

5.2.1 To ensure maintenance of programme the Project Manager will prepare monthly progress reports. Where programme slippage is identified action will be taken to increase resources, reschedule work or modify the order of work activities or work approach in order to rectify the delay. We will use buffer and risk management techniques by frequently updating a fully resourced MS Project programme. All significant changes will be communicated to the Client's Project Manager.

5.2.2 An updated GANTT chart programme will accompany the monthly progress reports. Supplementary weekly progress reports can be issued during critical stages of the programme, if required.

### **5.3 Meetings**

5.3.1 Regular meetings (every month or two months) are proposed as well as an evening presentation of the final report to Members of the Council and one-date time presentation to Officers.

### **5.4 Risks and Proposed Mitigation**

5.4.1 We have written this proposal in response to specific requirements and our costs are based on the activities required to produce the desired outcomes. If the scope of the works is increased from those stated in this document, then the project budget will be subject to an increase in line with any additional work requested.

5.4.2 The programme will be reliant upon Halcrow receiving comments from the draft report and maps within the designated timeframe. Halcrow will collate the comments and action any amendments following the deadline for receipt of comments. If any additional draft is required following the delivery of late comments, Halcrow will endeavour to create an additional draft for circulation. However, the work and therefore associated cost to produce any further drafts will be subject to an increase in budget.



## 5.5 H&S, Quality and Environmental Systems

5.5.1 Halcrow's quality assurance process is defined by our policy "Management of Quality, Safety and the Environment Policy Statement". Halcrow is fully committed to the implementation of this policy, which is vital to our continuing success, reputation and professional satisfaction of our staff. All employees are required to implement the policy in all working environments with a view to achieving best practice within Halcrow and the wider community.

5.5.2 Halcrow implements an integrated management system, Halcrow Group Business System (HGBS), which covers quality, health and safety, environmental and internal business needs. The system is used to control the processes affecting the provision of multi-disciplinary management, professional/technical design and project management consultancy services.

5.5.3 HGBS includes a quality management system registered to BS EN ISO 9001 standards, an environmental management system registered to BS EN ISO 14001 standards and meets the requirements of OHAS 18001 for occupational health and safety. Our management system takes account of the fact that each commission is unique and demands an individually planned approach to the management of project activities.

5.5.4 HGBS has the following principles:

- Provides an economic and effective framework for meeting the requirements of clients, international standards and consultancy legislation.
- Encourages all staff to accept responsibility for their own work and safety ensures that risks (health & safety, and commercial) are covered by the appropriate level of management systems.
- Provides a basis for client focus and continual improvement.
- Provides appropriate training for staff at all levels to ensure that they are competent to carry out their duties and responsibilities.
- Promotes best working practice by placing an emphasis on the prevention of problems and non-conformities rather than the causes.
- Supports professional judgement by utilising Halcrow corporate knowledge and the necessary competence and skills from Halcrow staff.
- Recognises environmental awareness and health & safety as an integral part of Halcrow business performance.

5.5.5 Health & safety on site: When working away from the office all Halcrow staff, are required to adhere to specific safety procedures. These procedures include our lone worker precautions, which require a risk assessment of the proposed work areas, safety measures to be identified and a 'call-in' schedule to be established so that safety can be checked throughout the day.

## 6 Proposed Fees

6.1.1 We estimate that the cost of the SFRA can be reduced to £8,000 (exc. VAT) for a Level 1 SFRA. This quotation is open for acceptance for a period of two months. Travel and subsistence expenses are included. No allowance has been made for the purchase of data, which we assume will be made available at no charge to the project.

6.1.2 No allowance has been taken for representations at Public Enquires.

6.1.3 The adopted charge rates for this proposal are:

Initials	Name	Job Title	Daily Rate (£)
RP	Roger Prescott	Senior Planner	642.0
BV	Bruno Venturini	Project Manager	612.0
FB	Fiona Brown	Environmental Manager	592.0
PW	Peta Wolmarans	Project Director	596.0
MAC	Mike Cope	Flood Specialist	487.0
MP	Marcus Phillips	Coastal Engineer	410.0
MB	Mike Barker	Hydrogeologist	456.0
MC	Mike Cunnington	Graduate Engineer	243.0
SR	Saber Razjmojei	Hydraulic modeller/GIS	309.0
AB	Adam Bryan	GIS Analyst and QA	250.0

## **7 Supporting Information**

### **7.1.1 Insurance**

Confirmation of professional indemnity insurance can be provided on request.

# **Winchester City Council**

Strategic Flood Risk Assessment for Local  
Development Framework

Final  
July 2007

**Halcrow Group Limited**





# **Winchester City Council**

## Strategic Flood Risk Assessment for Local Development Framework

Final

July 2007

# **Halcrow Group Limited**

### **Halcrow Group Limited**

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# **Winchester City Council**

## Strategic Flood Risk Assessment for Local Development Framework

### Contents Amendment Record

This report has been issued and amended as follows:

Issue	Revision	Description	Date	Signed
1	1	Draft	May 07	AS/BV
2	1	Final	July 07	AS/BV





# Contents

<b>1</b>	<b>Executive Summary</b>	<b>1</b>
<b>2</b>	<b>Background Information</b>	<b>3</b>
	2.1 <i>Terms of Reference</i>	3
	2.2 <i>The Study Area</i>	3
	2.3 <i>Constraints on development</i>	4
<b>3</b>	<b>Planning Context</b>	<b>6</b>
	3.1 <i>Introduction</i>	6
	3.2 <i>National Planning Policy</i>	6
	3.3 <i>Regional Planning Policy</i>	7
	3.4 <i>Local Planning Policy</i>	8
<b>4</b>	<b>PPS 25 Flood Zones, Environment Agency Flood Zones and SFRA Flood Maps</b>	<b>13</b>
	4.1 <i>Introduction</i>	13
	4.2 <i>The PPS 25 Flood Zones</i>	13
	4.3 <i>Environment Agency Flood Zones</i>	14
	4.4 <i>SFRA Flood Maps</i>	15
<b>5</b>	<b>PPS 25 and its Practice Guide Companion</b>	<b>16</b>
	5.1 <i>PPS 25 - Key Aims</i>	16
	5.2 <i>Outcomes of the SFRA Process</i>	17
	5.3 <i>The Sequential Test of PPS 25</i>	17
	5.4 <i>The Exception Test of PPS 25</i>	17
	5.5 <i>The Practice Guide Companion to PPS 25</i>	18
	5.6 <i>SFRA Levels 1 and 2</i>	19
<b>6</b>	<b>Study Methodology</b>	<b>21</b>
	6.1 <i>Specific Project Outputs</i>	21
	6.2 <i>Approach to Data Gathering</i>	21
	6.3 <i>Forms of Flooding and Data Limitations</i>	22
	6.4 <i>Production of Flood Maps</i>	27
	6.5 <i>Climate Change Flood Maps</i>	29
<b>7</b>	<b>Flood Risk in the Study Area</b>	<b>30</b>
	7.1 <i>Introduction</i>	30

7.2	<i>Geology and Hydrology</i>	30
7.3	<i>Historical Flooding</i>	31
7.4	<i>Areas Where Development May Increase Flood Risk Elsewhere</i>	35
<b>8</b>	<b>CFMP, SMP, Flood Management Measures and Flood Warning Systems</b>	<b>37</b>
8.1	<i>Introduction</i>	37
8.2	<i>CFMPs</i>	37
8.3	<i>Flood Management Measures and Flood Warning Systems</i>	38
<b>9</b>	<b>Guidance on the Application of the Sequential Test</b>	<b>39</b>
9.1	<i>Introduction</i>	39
9.2	<i>First Step – Strategic Overview of Flood Risk for all Potential Areas</i>	39
9.3	<i>Second Step – Flood Risk Issues in Zone 1</i>	39
9.4	<i>Third Step – Sequential Test in Zones 2 and 3</i>	40
<b>10</b>	<b>Guidance for the preparation of Flood Risk Assessments</b>	<b>41</b>
10.1	<i>Introduction</i>	41
10.2	<i>Proposed Developments within Flood Zone 3a and 2</i>	41
10.3	<i>Proposed Development within Zone 1</i>	42
10.4	<i>Raised Floor Levels, Basements and Dry Access (Freeboard)</i>	43
<b>11</b>	<b>Guidance for the Application of Sustainable Drainage Systems</b>	<b>44</b>
11.1	<i>Introduction</i>	44
11.2	<i>Types of SUDS Systems</i>	44
11.3	<i>Application of SUDS for the Proposed Allocation Sites</i>	46
11.4	<i>Effective application of SUDS techniques</i>	46
<b>Appendix A</b>	<b>Details of the Environment Agency Flood Zones</b>	
A.1	<i>Introduction</i>	

*A.2 Areas Benefiting from Defences*

*A.3 Climate Change Effect on Flood Zones*

## **Appendix B      Audit Trail Database**

### **Tables**

***Table 1 - Sources of Flooding***

***Table 2 – Historical Flooding - Southern Water***

***Table 3 – Localised Flooding Areas***

### **Figures**

***Figure 1 - Study Area***

***Figure 2 – Schematic of the PPS 25 Flood Zones***

***Figure 3 – Distribution of Soil Permeability***

***Tiles A to F – Flood Maps: Zones 2, 3a, 3b and Localised  
Flooding Areas***



# Glossary of Terms

**Annual Monitoring Report (AMR)** - Assesses the implementation of the Local Development Scheme and the extent to which policies in Local Development Documents are being successfully implemented.

**Area action plans** – Development Plan Documents that provide a planning framework for areas of change and areas of conservation.

**Core Strategy** - The Development Plan Document which sets the long-term spatial planning vision and objectives for the area. It contains a set of strategic policies that are required to deliver the vision including the broad approach to development.

**Development plan** - As set out in Section 38(6) of the Planning and Compulsory Purchase Act (2004), an authority's development plan consists of the relevant Regional Spatial Strategy (or the Spatial Development Strategy in London) and the Development Plan Documents contained within its Local Development Framework.

**Development Plan Documents (DPDs)** - Spatial planning documents within the Council's Local Development Framework which set out policies for development and the use of land. Together with the Regional Spatial Strategy they form the development plan for the area. They are subject to independent examination. They are required to include a core strategy and a site allocations document, and may include area action plans if required; other DPDs may also be included, e.g. development control policies.

**DEFRA** - Department of Environment, Food & Rural Affairs Development.

**Emergency Planning** – Planning for and response to emergencies such as flooding, including consideration of the resilience of emergency infrastructure that will need to operate during flooding.

**Environment Agency** - The leading public body for protecting and improving the environment in England and Wales. Flood management and defence are a statutory responsibility of the Environment Agency; it is consulted by local planning authorities on applications for development in flood risk areas, and also provides advice and support to those proposing developments and undertaking Flood Risk Assessments. The Environment Agency reports to DEFRA.

**Environment Agency Flood Zones** - Nationally consistent delineation of 'high' and 'medium' flood risk, published on a quarterly basis by the Environment Agency.

**Flood Estimation Handbook** - The latest hydrological approach for the estimate of flood flows in UK.

**Flood Risk Vulnerability** - PPS 25 provides a vulnerability classification to assess which uses of land may be appropriate in each flood risk zone.

**Formal Flood Defence** - A structure built and maintained specifically for flood defence purposes.

**Habitable Room** - A room used as living accommodation within a dwelling but excludes bathrooms, toilets, halls, landings or rooms that are only capable of being used for storage. All other rooms, such as kitchens, living rooms, bedrooms, utility rooms and studies are counted.

**Informal Flood Defence** - A structure that provides a flood defence function, but has not been built or maintained for this specific purpose (e.g. boundary wall).

**JFlow** - A computer river model based on routing a flood calculated by Flood Estimation Handbook methodology along a river corridor the levels of which are derived from a Side Aperture Radar (SAR) remote sensed Digital Terrain Model.

**LiDAR** – ‘Light Detection and Ranging’ is an airborne terrain mapping technique which uses a laser to measure the distance between the aircraft and the ground. It therefore provides accurate topographical/contour mapping.

**Local development documents** – the collective term for Development Plan Documents and Supplementary Planning Documents.

**Local Development Framework (LDF)** - The name for the portfolio of Local Development Documents. It consists of the Local Development Scheme, a Statement of Community Involvement, Development Plan Documents, Supplementary Planning Documents, and the Annual Monitoring Report.

**Local Development Scheme (LDS)** - Sets out the programme for preparing Local Development Documents. All authorities must submit a Scheme to the Secretary of State for approval within six months of commencement of the 2004 Act (thus all authorities should now have submitted an LDS). LDSs are subject to review.

**‘Making Space for Water’ (DEFRA 2004)** - The Government’s new evolving strategy to manage the risks from flooding and coastal erosion by employing an integrated portfolio of approaches, so as: a) to reduce the threat to people and their property; b) to deliver the greatest environmental, social and economic benefit, consistent with the Government’s sustainable development principles, c) to secure efficient and reliable funding mechanisms that deliver the levels of investment required.

**Planning Policy Statements** - The Government has updated its planning advice contained within Planning Policy Guidance Notes (PPGs) with the publication of new style Planning Policy Statements (PPSs), which set out its policy for a range of topics.

**Previously Developed (Brownfield) Land** - Land which is or was occupied by a building (excluding those used for agriculture and forestry). It also includes land within the curtilage of the building, for example a house and its garden would be considered to be previously developed land. Land used for mineral working and not subject to restoration proposals can also be regarded as brownfield land.

**Regional Spatial Strategy** - Sets out the region’s policies in relation to the development and use of land and forms part of the development plan for local planning authorities.

**Residual Risk** - The risk which remains after all risk avoidance, reduction and mitigation measures have been implemented.

**Statement of Community Involvement (SCI)** - Sets out the standards which authorities will achieve with regard to involving local communities in the preparation of local development documents and development control decisions. It is subject to independent examination.

**Strategic Environmental Assessment (SEA)** - A generic term used to describe environmental assessment as applied to policies, plans and programmes. The European ‘SEA Directive’ (2001/42/EC) requires a formal ‘environmental assessment of certain plans and programmes, including those in the field of planning and land use’.

**Supplementary Planning Documents (SPDs)** - Provide supplementary information in respect of the policies in Development Plan Documents. They do not form part of the Development Plan and are not subject to independent statutory examination, but are normally subject to public consultation.

**Sustainability Appraisal (SA)** - Tool for appraising policies to ensure they reflect sustainable development objectives (i.e. social, environmental and economic factors) and required in the 2004 Act to be undertaken for all local development documents. It incorporates Strategic Environmental Assessment.

**Sustainable Development** – “Development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (The World Commission on Environment and Development, 1987).

**The Exception Test** - If, following application of the Sequential Test, it is not possible (consistent with wider sustainability objectives) to demonstrate that there are no reasonably available sites in areas with less risk of flooding that would be appropriate to the type of development or land use proposed, the Exception Test may apply. PPS 25 sets out strict requirements for the application of the Test.

**The Sequential Test** - Informed by a Strategic Flood Risk Assessment, a planning authority applies the Sequential Test to demonstrate that there are no reasonably available sites in areas with less risk of flooding that would be appropriate to the type of development or land use proposed.





# 1 Executive Summary

In March 2007, Winchester City Council commissioned Halcrow to produce a Strategic Flood Risk Assessment in accordance with Planning Policy Statement 25 (PPS 25) and the recently published document: Development and Flood Risk, a Practice Guide Companion to PPS 25 (February 2007).

This Strategic Flood Risk Assessment and the scoping stage of a Sustainability Appraisal, which is being prepared by Enfusion Ltd, will inform the plan-making process of the Local Development Framework. They will in particular inform the Core Strategy, the Development Provision and Allocations and the Development Control Policies development plan documents.

This report provides an overview of the methodology, assumptions, uncertainties, tasks undertaken and the links to the wider sustainability appraisal process. It provides policy recommendations and guidance for the application of the Sequential Test, the preparation of flood risk assessments and the use of sustainable drainage systems, within the City Council's administrative boundary

Since the South East Hampshire and the Test and Itchen Catchment Flood Management Plans (CFMPs) are yet to be completed, it is recommended to base policies and actions from similar CFMP policies where these have been developed. The proposed main message and implementations for this SFRA and consequently the Local Development Framework are:

<b>Main Message</b>	<b>SFRA Implementations</b>
PPS25 provides the policy framework to make sure that flood risk is considered in new developments. There does not need to be a radical change in the way the risk is managed in these areas. The aims are to continue to maintain watercourses, increase flood awareness and provide appropriate flood warnings.	Make sure that the flood risk is managed appropriately in these areas by applying PPS25. The aims of PPS25 are to ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas at highest risk. There may be exceptional circumstances where new development is necessary. In such areas, policy aims to make it safe without increasing the risk elsewhere and, where possible, to reduce the overall flood risk. Structural works may be required to reduce flood hazard within acceptable limits at Level 2 SFRA locations.

Further more detailed work may be required to determine more precise locations appropriate for development pending the undertaking of the Sequential Test. It is likely that flood hazard mapping (which identifies the level of risk to life and property) may be required as a Level 2 SFRA, at all locations where the Exception Test will need to be undertaken.

## **2 Background Information**

### **2.1 Terms of Reference**

In March 2007, Winchester City Council commissioned Halcrow to produce a Strategic Flood Risk Assessment in accordance with Planning Policy Statement 25 (PPS 25). Advice on flood risk within the administrative boundary of the planning authority is required to support the preparation of their Local Development Framework, in accordance with government guidance and advice from the Environment Agency.

This report complies with the proposal dated 12 March 2007.
---

### **2.2 The Study Area**

Winchester District lies within central/southern Hampshire bordered by Basingstoke and Deane, Portsmouth, Havant, Fareham, Test Valley, Eastleigh, and East Hampshire local authorities. A number of these are influential in the way Winchester District functions and is used by its residents.

The District covers an area of 64,750 hectares with a resident population of some 112,500 people. The District is mainly countryside interspersed with many small towns and villages. The main centre for commercial activity is the city of Winchester, with other main centres in the rural part of the District being Alresford, Bishops Waltham, Denmead, Wickham and Whiteley.

It has a diverse countryside including chalk downs, large arable fields, extensive woodland, river valleys, heath remnants, historic parks and clay lowland pastures. The many rural settlements tend to have strong distinctive characters based on their landscape setting, form and vernacular architecture and materials, which include flint, thatch, timber, brick and clay tiles. Indeed the geology of the District has influenced where settlements have evolved.

The northern part of the District is dominated by chalk and forms part of the Hampshire Downlands which lies to the north and east of Winchester. Through the centre of the District is the east-west chalk ridge characterised by a more elevated landscape combining rolling arable fields interspersed with parkland and woodland, this area falls within the East Hampshire Area of Outstanding Natural Beauty, which

covers an area of approximately 382 km<sup>2</sup> originally designated in 1962. It is now designated as a National Park awaiting confirmation by the Secretary of State following a public inquiry in 2004.

### **2.3 Constraints on development**

There are two environmentally sensitive areas (ESA's) which fall partly within the Winchester District – the South Downs ESA and the Test Valley ESA along the River Dever. There are also two National Nature Reserves in the District at Old Winchester Hill and Beacon Hill.

There are a number of sites of special scientific interest (SSSI's) designated for their ecological or geological interest, typical habitats include :- species-rich grassland (e.g Cheesefoot Head), woodland (e.g Crab Wood), rivers and wetlands (e.g River Itchen), and wood pasture (e.g Hook Heath Meadows). The largest SSSI in the District is the River Itchen, which also flows through Eastleigh and Southampton, into the Solent European Marine Site.

In addition there are a number of Special Areas of Conservation Importance (SAC's) (e.g River Itchen, Solent Maritime), these are statutory designations of European importance under the EC's Habitats Directive on the conservation of natural habitats of flora and fauna. There is one Special Protection Area (SPA) designated under the EU Birds Directive within the District – Solent and Southampton Water SPA. This site is also designated under the Ramsar Convention on wetlands of international importance.

The Map on page XXX illustrates the locations of the above designated sites.

There are a number of water courses within the District – River Itchen, River Dever, River Hamble, River Meon, River Wallington, River Arle, plus many smaller tributaries – e.g. Candover Stream and Cheriton Stream. The chalk has a significant influence on the water features within the District. The Rivers Dever, Itchen and Meon all rise in the chalk uplands and eventually flow south, their valleys dissecting the chalk plateau before entering the clay lowland area and eventually the Solent. The most dominant river system is the River Itchen as well as the most populated supporting fishing and watercress farms. Large amounts of water collect in underground aquifers and springs emerge where the chalk meets an impervious layer of clay. Boreholes provide domestic and commercial water supplies for much of south Hampshire.

A large part of the District to the north, west and east of Winchester are included within the Test and Itchen Catchment Abstraction Management Strategy prepared by the Environment Agency. This report details how and where water is available and how the Environment Agency propose to manage this resource.

The District also has numerous locally designated Sites of Importance for Nature Conservation (SINCs).

### 3 Planning Context

#### 3.1 Introduction

This Strategic Flood Risk Assessment (SFRA) conforms with National and Regional Planning Policy. A SFRA is a living document which is used as a tool by a planning authority to assess flood risk for spatial planning, producing development briefs, setting constraints, informing sustainability appraisals, identifying locations of emergency planning measures and requirements for flood risk assessments.

The success of the Strategic Flood Risk Assessment is dependent upon the Planning Authority's ability to implement the recommendations put forward for future sustainable flood risk management in conjunction with the Environment Agency. It is their responsibility to establish policies to ensure future sustainability with respect to flood risk.

Emerging planning policies normally cover about 20 years in advance. Planning for flood management is a longer-term practice and SFRAs consider implications for spatial planning about 100 years ahead.

#### 3.2 National Planning Policy

The Government has updated its planning advice contained within Planning Policy Guidance Notes (PPGs) with the publication of new style Planning Policy Statements (PPSs). As they are policy documents PPSs carry more weight than their predecessors.

PPS 3 Housing (December 2005) specifically mentions the need to have regard to strategic flood risk assessments when local authorities are producing development plan documents relating to housing.

In December 2006 the Government published PPS 25: Development and Flood



Planning shapes the places where people live and work and the country we live in. It plays a key role in supporting the Government's wider economic, social and environmental objectives and for sustainable communities.



Risk (a restatement of PPG 25). It reflected the general direction set out in 'Making Space for Water' (Defra, 2004), the evolving new strategy to shape flood and coastal erosion risk over the next 10-20 years (see Glossary of Terms).

PPS 25 advises that regional planning bodies in preparing regional spatial strategies should include a broad consideration of flood risk from all sources and set out a strategy for managing it in accordance with policies and plans prepared under the Water Framework Directive. Local planning authorities should prepare local development documents in their LDF's that set out policies for the allocation of sites and the control of development which avoid flood risk to people and property where possible and manage it elsewhere. The guidance also advises that flood risk should be considered alongside other spatial planning issues such as transport, housing, economic growth, natural resources etc and that the findings of the SFRA should inform the sustainability appraisal of the LDF.

### 3.3 **Regional Planning Policy**

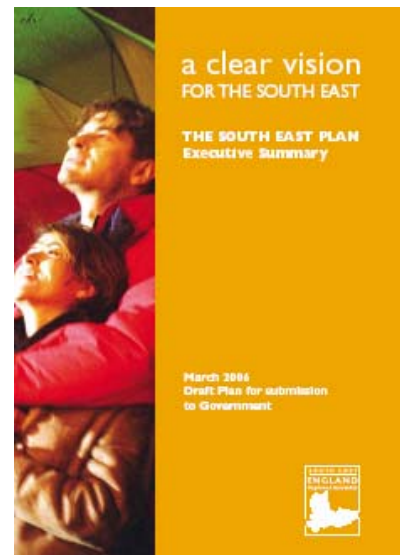
#### 3.3.1 *Regional Planning Guidance for the South East (RPG9)*

Regional planning policies provide the overarching framework for the preparation of a Local Development Framework (LDF). Regional Planning Guidance for the South East (RPG9) covers the period up to 2016 and sets out the housing requirement for each county within the region.

#### 3.3.2 *The South East Plan*

Under the Planning and Compulsory Purchase Act 2004, RPG9 is to be replaced by a new Regional Spatial Strategy, entitled the South East Plan. The South East Plan has been prepared by the South East England Regional Assembly (SEERA) and was submitted to the Government in March 2006. It sets out the vision for the region through to 2026. The examination into the South East Plan ran from November 2006 to March 2007, with the final plan anticipated in 2008.

The submitted South East Plan sets out a housing requirement for the Winchester district which requires some 10, 439 dwellings to be built between 2006 and 2026. In addition the RSS sets out policy guidance covering a range of matters to be reflected in local development frameworks. It is a requirement that development plan documents prepared under





the LDF including the Core Strategy are in general conformity with regional planning policy.

The South East Plan also includes policies on sustainable natural resource management, which highlights important issues for the South East region being water resources, river water and ground water quality management, flood risk management etc. Specifically Policy NRM3 covers Sustainable Flood Risk Management, indicates that the sequential approach to development in flood risk areas will be followed. In addition, the policy states that local authorities and developers, with advice from the Environment Agency, should undertake a Strategic Flood Risk Assessment. This should have regard to climate change.

### **3.4 Local Planning Policy**

#### **3.4.1 Winchester District Local Plan Review**

The Local Plan review adopted in July 2006 recognises the importance of achieving sustainable development and the role played by natural resources such as water. Chapter 3 of the local plan "Design and Development Principles" provides details of how the Council sees development proposals contributing towards the aim of achieving sustainable development within the District and the following highlights those parts of the plan that relate to the role of water resources and minimising flood risk :-

Para 3.4 - *"The need for more sustainable development is now a cornerstone of the City Council's Corporate Strategy and of this Local Plan. Key objectives are therefore to:*

- *improve energy and water efficiency in all development;*
- *ensure development or change of use does not exacerbate the risks of flooding or adversely affect the function of floodplains and that development is designed to avoid flood risk;*

Policy DP6 stresses the need to make efficient use of resources when planning and designing developments including the need to include :-

- (i) *measures to reduce water consumption and to safeguard the sources of water supply;*
- (ii) *sustainable drainage systems;*

This policy also states that *"development would not be wasteful in its use of energy or in its depletion of natural resources (e.g. groundwater supplies). Development*

*should not threaten groundwater supply or conflict with the Environment Agency's "Groundwater Protection Policy".*

Specific advice is given in relation to flood risk through Policy DP8, which was prepared in accordance with the advice in PPG25 and primarily seeks to avoid inappropriate development in areas at highest risk from flooding, and uses the Environment Agency's floodplain maps as the source of flooding data. The following extracts provide a context for this study:-

Para 3.50 .... Particular regard for flood risk should be had where development proposals:

- generate significant runoff from the site;
- impede (or impede the maintenance of) flood defences or existing structures which may serve as a flood defences;
- reduce water storage areas, either natural or manmade.

A particular characteristic of Winchester District, given the high proportion of chalk downland and relatively high water tables, is groundwater flooding. What are normally dry valley bottoms can become functional waterways during periods of intense or prolonged rainfall. Development proposed in these 'dry' valley bottoms should also include an assessment of risk.

*Policy DP.8 Development in areas at risk of flooding should follow a sequential approach to site selection, locating development in the lowest available flood risk area, unless this would compromise other sustainability objectives, including the priority to be given to the use of land within defined built-up areas, or other policies of this Plan. Subject to this, development or change of use will be permitted, provided that:*

- (i) appropriate measures are taken to ensure that the rate of runoff from the site will not be significantly increased;*
- (ii) in all areas with potential risk of flooding, access is maintained for essential civil infrastructure in times of emergency;*
- (iii) buildings are located away from 'dry' valley floors and other areas where there is a risk of groundwater flooding, and do not add to flood risk up or down stream.*

*In already developed floodplains at high risk of flooding (1 in 100 years or greater), development will only be permitted if an adequate level of flood defence already exists and can be maintained, buildings are designed to resist flooding, there are*

*suitable warning and evacuation procedures existing, and development does not add to flood risk up or down stream. Civil emergency infrastructure will not be permitted in these areas but, where it exists, provision for continued access at times of emergency should be made.*

*In underdeveloped or sparsely developed floodplains at high risk of flooding (1 in 100 years or greater), development will only be permitted where, exceptionally, there is an overriding need for the location proposed, such as for essential infrastructure.*

*Development or change of use in functional floodplains will not be permitted other than for sport, recreation, amenity or conservation, or essential transport and utility infrastructure, in which case adequate warning and evacuation procedures should be in place. Such development should be designed to an appropriate standard of safety, to avoid increasing flood risk elsewhere or inhibiting the essential maintenance of the river system (including flood defences).*

### 3.4.2 *Local Development Framework and Sustainability Appraisal*

With the introduction of Local Development Frameworks in 2004, Winchester City Council identified the need for three development plan documents to be produced:

1. The Core Strategy
2. Development Provision and Allocations
3. Development Control Policies

The detailed timeframes for the preparation of these is set out in the Council's Local Development Scheme which can be viewed at [www.winchester.gov.uk](http://www.winchester.gov.uk).

The first development plan document to be prepared is the Core Strategy, which will not only set out the spatial development strategy for the district, but also include key land allocations and policies. The role of this SFRA is to inform the decision making process to determine the best and most sustainable options for the spatial development strategy. Further more detailed work may be required to determine more precise locations appropriate for development pending the undertaking of the Sequential Test.

The practice guide companion to PPS 25 advises that "The Core Strategy LDD should include clear, strategic and robust policies for the management of flood risk within the local authority area taking climate change into account."

As previously recognised flood risk is one many factors to influence the spatial planning process however it is necessary to maintain a balance between flood risk considerations and other sustainable development drivers, this is undertaken through the Sustainability Appraisal process.

The purpose of sustainability appraisal is to promote sustainable development through the integration of social, economic and environmental considerations. It is now a requirement of the Planning and Compulsory Purchase Act 2004 for LDF's to undergo sustainability appraisal incorporating the requirements of the Strategic Environmental Assessment (SEA) Directive.

In relation to water an integrated approach to the management of water is a key aim of the EU Water Framework Directive (Water Framework (England and Wales) Regulations 2003), this aims to integrate sustainable water planning and management. The Water Framework Directive applies to all surface and ground water bodies with significant effects for spatial and development management planning. A new system of river basin management plans (RBMP) will be statutory plans that set out the actions required to meet the water framework directive with the overall aim of achieving good water status. RBMPs are strategic plans, and will be subject to strategic environmental assessment and appropriate assessment under the Habitats Directive. All these processes are based on multi-criteria analysis to enable correlation between the objectives. RBMP's will need to take into account existing studies and reports such as this Level 1 SFRA and the CFMP's being prepared.

In Winchester the sustainability appraisal process has commenced in conjunction with preparation of the Core Strategy. The scoping stage is nearing completion and will establish a baseline and define a scope to inform the identification of the key sustainability issues that will need to be addressed through the core strategy. The sustainability appraisal process will also set out a series of sustainability objectives, which will be used to undertake the appraisal process of the document and its contents.

A review of relevant plans and policies undertaken to date has revealed the following issues in relation to water and flooding to be covered through the LDF:

- Flood risk: consider the information available on the nature of flood risk and its potential consequences and accord it appropriate weight in the preparation of

development plans and in determining applications for planning permission and attaching conditions where permission is granted.

- Water resources: ensure that water is available to those who need it, and that it is used wisely; to review feasible water management options, including innovative solutions. Monitor levels of water abstraction.
- Water quality: protect and improve water quality.

The baseline assessment highlights a number of issues for the LDF including:

- Need to reconcile population growth and pressure on the sewage system.
- Need to reconcile population growth both within and adjacent to the District on the increased demands on water supply.
- To improve knowledge of those properties known to be at flood risk.

This information will contribute towards the formulation of sustainability appraisal objectives and a framework to be applied to the Winchester LDF.

Furthermore it is important to recognise the value of water and water features in their wider context of providing opportunities for recreational use and connections with the green infrastructure network, in addition to their biodiversity value. The Winchester Biodiversity Action Plan (2007) identifies a number of actions in relation to water, primarily to protect and enhance habitats.

## 4 PPS 25 Flood Zones, Environment Agency Flood Zones and SFRA Flood Maps

### 4.1 Introduction

A good understanding of the PPS 25 Flood Zones, the Environment Agency Flood Zones and SFRA Flood Maps is of fundamental importance for SFRAs. Flood Maps are the key elements in a SFRA as they provide a visual understanding of flood risk at strategic level.

### 4.2 The PPS 25 Flood Zones

The PPS 25 Flood Zones subdivide the land, according to its spatial variation of flood probability, into 4 classifications; the low, medium and high probability flood zones and the functional floodplain - Zones 1, 2, 3a and 3b respectively (see **Figure 2: Schematic of the PPS 25 Flood Zones**). A Flood Zone can also be defined as the combination of a number of flood outlines (the maximum extents of floods) from events that fall within a range of probabilities. In the case of Zone 1, for example, it will be the combination of flood outlines that fall within events with 0.1% flood probability or less (very extreme events).

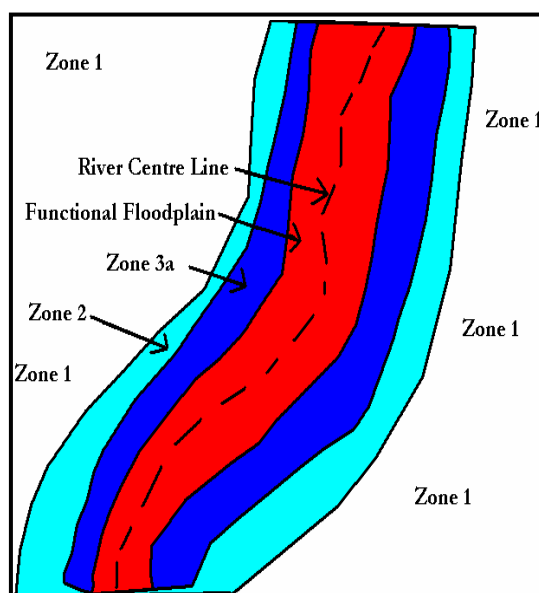
PPS 25 defines the flood zones as follows:

#### Zone 1 - Low Probability

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

#### Zone 2 - Medium Probability

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



*Figure 2: Schematic of the PPS 25 Flood Zones*

**Zone 3a - High Probability**

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

**Zone 3b - The Functional Floodplain**

This zone comprises land where water has to flow or be stored in times of flood. SFRA's should identify this Flood Zone (land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1%) flood, or at another probability to be agreed between the Local Planning Authority (LPA) and the Environment Agency, including water conveyance routes).

The range of probabilities covered by each flood zone is defined in PPS 25, in terms of annual average probability of flooding from rivers and the sea. The term 'average' means that, for example, a flood that has a 100% (or 1 in 1) probability of occurrence, will, over a number of years, have occurred once a year on average, although in any given year it may have occurred more than once or not flooded at all.

There are many methods that estimate the probability of occurrence of a flood, based on historical events, measurements of flows, modelling studies, etc. In the case of the functional floodplain, it may be possible for this to be drawn on a map by combining the flood extents of many frequent historical flood events (up to the 5% probability event). For more extreme flood events (lower probability events), however, it will be increasingly necessary to rely on modelling to determine the extents, as there are not many sufficiently accurate records available.

**4.3 Environment Agency Flood Zones**

Historically the Environment Agency and its predecessors have kept formal maps of tidal and fluvial flooding to the standards required by legislation. Originally this mapping simply recorded flood events, but in 2001, PPG 25 (the predecessor of PPS 25 – see **Section 3.2**) imposed a duty on the Environment Agency to produce flood zone maps which showed the predicted extent of tidal and fluvial flooding for the high, medium and low flood zones. The Environment Agency flood zones are published on their website at <http://www.environment-agency.gov.uk/subjects/flood/?lang=e>, and are updated on a quarterly basis as improved modelling and recent events provide data for refining flood extents.

The only difference in the definition of the Environment Agency flood zones and the PPS 25 flood zones is that the former's high probability flood zone refers to Zone 3,

with no distinction between Zones 3a and 3b (Zone 3a + Zone 3b = Zone 3). Distinguishing the functional floodplain, Zone 3b, is a recent PPS 25 requirement. Both definitions do not rely on the presence of defences (formal or informal, see Glossary of Terms) as these could fail during a flood as a result of poor maintenance. Both definitions refer primarily to flooding from rivers and the sea, although the Environment Agency flood zones sometimes include other sources of flooding which occur in the vicinity of a main river if these are extensive or significant (see **Appendix A** for further details about the Environment Agency flood zones). PPS 25 flood zones are not intended to include flooding from groundwater or other sources, although in practice they may be included, particularly if zones have been defined based on historical records where there may be a combination of sources or uncertainty about the cause of flooding.

#### **4.4 SFRA Flood Maps**

SFRA Flood Maps in general reproduce the Environment Agency high, medium and low probability flood zones where no other more up-to-date information is available. They also include assessments of the functional floodplain and the effect of climate change on the flood zones, where appropriate.

SFRA Flood Maps do not only show updated flood zones, they also show 'localised flooding areas' and flood incident records from other sources/forms of flooding (see **Section 6.3.5** and **Tiles A to F**).



## 5 PPS 25 and its Practice Guide Companion

### 5.1 PPS 25 - Key Aims

The key aims of PPS 25 are reproduced below:

'The aims of planning policy on development and flood risk are to ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas at highest risk. Where new development is, exceptionally, necessary in such areas, policy aims to make it safe without increasing flood risk elsewhere and where possible, reducing flood risk overall.

Regional planning bodies and local planning authorities (LPAs) should prepare and implement planning strategies that help to deliver sustainable development by:

#### Appraising risk

- identifying land at risk and the degree of risk of flooding from river, sea and other sources in their areas;
- preparing Regional Flood Risk Appraisals (RFRAs) or Strategic Flood Risk Assessments (SFRAs) as appropriate, as freestanding assessments that contribute to the Sustainability Appraisal of their plans;

#### Managing risk

- framing policies for the location of development which avoid flood risk to people and property where possible, and manage any residual risk, taking account of the impacts of climate change;
- only permitting development in areas of flood risk when there are no reasonably available sites in areas of lower flood risk and benefits of the development outweigh the risks from flooding;

#### Reducing risk

- safeguarding land from development that is required for current and future flood management e.g. conveyance and storage of flood water, and flood defences;
- reducing flood risk to and from new development through location, layout and design, incorporating sustainable drainage systems (SUDS);
- using opportunities offered by new development to reduce the causes and impacts of flooding e.g. surface water management plans; making the most of the benefits of green infrastructure for flood storage, conveyance and SUDS; recreating functional floodplain; and setting back defences.

#### A partnership approach

- working effectively with the Environment Agency, other operating authorities and other stakeholders to ensure that best use is made of their expertise and information so that plans are effective and decisions on planning applications can be delivered expeditiously (this is currently being implemented by a series of pilot projects for DEFRA) and
- ensuring spatial planning supports flood risk management policies and plans, River Basin Management Plans and emergency planning.'

### **5.2 Outcomes of the SFRA Process**

The broad planning objectives of PPS 25 described in **Section 5.1**, effectively set the scope for the specific outcomes of the SFRA process. The SFRA, in turn, then informs forward planning and development control decisions that ensure the objectives set out above can be achieved.

It is important to reiterate that PPS 25 is not applied in isolation as part of the planning process. The formulation of flood risk policy and the allocation of land for future development must also meet the requirements of other planning policy. Clearly, a careful balance must be sought in these instances, and the SFRA aims to assist in this process through the provision of a clear and robust evidence base upon which informed decisions can be made.

### **5.3 The Sequential Test of PPS 25**

In seeking to allocate a specific type of development or land use, planning authorities should apply the Sequential Test to demonstrate that there are no reasonably available, appropriate sites in areas with less risk of flooding.

Preference should be given to locating new development in Flood Zone 1 (see **Section 4.2**) because this zone has the lowest risk of flooding. If there is no reasonably available site in Flood Zone 1, the flood vulnerability (or level of resilience to damages from flooding) of the proposed development can be taken into account in locating development in Flood Zone 2 and then, if no appropriate sites are available, Flood Zone 3.

Within each Flood Zone new development should be directed to sites with lower flood risk (towards the adjacent zone of lower probability of flooding) from all sources as indicated by the SFRA.

### **5.4 The Exception Test of PPS 25**

If, following application of the Sequential Test, it is not possible for the development to be located in zones of lower probability of flooding consistent with wider

sustainability objectives, the Exception Test can be applied. This Test provides a method of managing flood risk while still allowing necessary development to occur.

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 economic blight and the need for essential civil infrastructure to remain operational during floods. It may also be appropriate to use it where restrictive national designations such as landscape, heritage and nature conservation designations, e.g. Areas of Outstanding Natural Beauty (AONBs), Sites of Special Scientific Interest (SSSIs) and World Heritage Sites (WHS), prevent the availability of unconstrained sites in lower risk areas.

For the Exception Test to be passed:

- 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 Development Plan Document has reached the 'submission' stage (see Figure 4 of PPS 12: Local Development Frameworks), the benefits of the development should contribute to the Core Strategy's Sustainability Appraisal;
- b) the development should be on developable previously-developed land or, if it is not on previously developed land, there are no reasonable alternative sites on developable previously-developed land; and
- c) a flood risk assessment (FRA) must demonstrate that the development will be safe, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

It is possible that, even when applying the sequential and exception tests, a local planning authority cannot reasonably allocate in its Local Development Documents all the requirements for new development imposed by the Regional Spatial Strategy. However, such a conclusion should be based on firm evidence and be supported by the Environment Agency.

## **5.5 The Practice Guide Companion to PPS 25**

A new practice guide companion to PPS 25 has been recently published in February 2007. It is a 'living draft' web-based consultation paper (see

<http://www.communities.gov.uk/index.asp?id=1504639>). It is comprehensive and incorporates many recommendations from previous Guidance documents.

The guide reaffirms the adoption of a risk-based approach to flooding by following stepped hierarchical measures at all stages in the planning process. Avoidance/prevention is always the first measure, followed by substitution, control and finally mitigation. This is summarised in Table 1.2 of the Practice Guide Companion to PPS 25, which is reproduced in the Table below).

Table 1.2 Overview of the flood risk management hierarchy			
Flood Risk Management Measure	Description	Example tools and measures	Key responsible parties
<b>Avoidance/Prevention</b>	Allocate developments to areas of least flood risk and apportion development types vulnerable to the impact of flooding to areas of least risk	Regional Flood Risk Appraisals (RFRA), Strategic Flood Risk Assessments (SFRAs), Flood Risk Assessments (FRAs) and application of the sequential approach	Planning bodies
<b>Substitution</b>	Substitute less vulnerable development types for those incompatible with the degree of flood risk		Planning bodies and developers
<b>Control</b>	Implement measures to reduce flood frequency to existing developments  Appropriate design of new developments	River Basin Management Plans (RBMPs), Catchment Flood Management Plans (CFMPs), Shoreline Management Plans (SMPs), Flood Risk Management Strategies, appraisal, design and implementation of flood defences	Environment Agency and other flood and coastal defence operating authorities, developers and sewerage undertakers
<b>Mitigation</b>	Implement measures to mitigate residual risks	Flood risk assessments. Incorporating flood resistance and resilience measures. Emergency Planning Documents.  Implementation of flood warning and evacuation procedures	Planning bodies, developers, the Environment Agency, other flood and coastal defence operating authorities and sewerage undertakers

The Sequential Test of PPS 25 is the most important flood risk management tool for spatial planning, as it implements the high level measures of avoidance/prevention and substitution (see **Section 5.3**).

## 5.6 SFRA Levels 1 and 2

A Level 1 SFRA is defined in the Practice Guide Companion to PPS 25, as the level that provides the necessary information for undertaking the Sequential Test.

Where the need to apply the Exception Test is identified, due to there being an insufficient number of suitably available sites for development within zones of lower flood risk, the scope of the SFRA is widened to a more detailed Level 2 study. A Level 2 is also likely to be of value in informing the LPA in dealing with windfall planning applications, that is, those on land not allocated in the development plan. This information, however, will not necessarily negate the need for a site specific flood risk assessment, the responsibility for which would fall upon the potential developer.

The scope of this report is a Level 1 SFRA to inform the plan-making process of the Core Strategy and other development plan documents as required (see **Section 3.4**). This information will be used by the planning authority to undertake sequential testing in identifying general locations for development and to formulate strategic policies, and may assist in informing the Council's emergency plan. The study covers the area within the administrative boundary of Winchester City Council.

## 6 Study Methodology

### 6.1 *Specific Project Outputs*

The specific outputs are based on the required outputs for a Level 1 SFRA, as follows:

- i. Map existing Flood Zones 1, 2 and 3 across the plan area (see **Section 6.4.1, Tables 2 and 3** and **Tiles A to F**).
- ii. Map Flood Zones 1, 2 and 3 for the future climate change scenarios of 2070 and 2115 as set out in PPS 25 Annex B, taking account of recommended national precautionary sensitivity ranges for peak rainfall intensities, peak river flows and wave heights (see **Section 6.4.2**).
- iii. Identify areas at risk from flooding from sources other than rivers and the sea (see **Sections 6.3, 6.4.1, Chapter 7, Tables 2 and 3**, and **Tiles A to F**).
- iv. Identify and take into account flood risk management measures including flood defences and emergency warning systems (see **Chapter 8**).
- v. Guidance on the Application of the Sequential Test (see **Chapter 9**).
- vi. Guidance for the preparation of Flood Risk Assessments (see **Chapter 10**).
- vii. Guidance on possible mitigation measures, including the likely applicability of different sustainable drainage systems (SUDS) techniques for managing surface water runoff at key Level 1 SFRA development sites (see **Chapter 11**).
- viii. Identify locations where development would significantly increase the risk of flooding elsewhere (see **Section 11.4**).

### 6.2 *Approach to Data Gathering*

The main source of data for this study has been the Environment Agency, previous Halcrow projects, a number of relevant websites, the Local Planning Authorities, Hampshire County Council and Southern Water (see Audit Trail Database in **Appendix B**).

Priority has been given to the collection of geo-referenced information in electronic format, to ensure the effective management of the data within a GIS environment. All incoming data has been recorded on a project data register by a specialist document controller/GIS data manager, specifically designated for this project.

The quality review of the information has been carried out by an experienced core team. The team has been able to review the collected data, assess its significance and quality, and advise on which part of the collected data needed to be used for the SFRA.

The main approach has been to build on the large number of strategic studies and relevant available data. Although the South East Hampshire and the Test and Itchen Catchment Flood Management Plans (CFMPs) are not yet complete, the Scoping stage is completed and this has provided a good foundation for catchment understanding and flood risk assessment.

Valuable flood risk information for localised flooding areas (as opposed to the 'non-localised' flood zones) was obtained from the drainage specialists working for Winchester City Council and Hampshire County Council. The collected information complemented information provided by the Environment Agency, Southern Water and the local planning authority.

### **6.3 Forms of Flooding and Data Limitations**

#### **6.3.1 Introduction**

For the purpose of this assessment, forms of flooding (also defined as sources of flooding) are divided into four categories:

- a) river floods;
- b) flooding from impounded water bodies such as canals and reservoirs;
- c) groundwater flooding;
- d) flooding from other sources.

The reason for adopting this classification is to provide an understanding of data limitations and assumptions as there are different standards for the collection of each of these types of data.

The various sources of flooding within the study area are described and shown in **Tables 2 and 3** and **Tiles A to F**.

### 6.3.2 *Tidal and Fluvial Flooding*

Fluvial flooding (flood zones) is described in Sections **4.2 and 4.3**, with further details, including assumptions and limitations, in **Appendix A**. As the Winchester City area is inland, it does not experience tidal flooding.

### 6.3.3 *Records of Flooding from Impounded Water Bodies*

Records of flooding from reservoirs and canals are erratic as there is no requirement for the Environment Agency to provide information on historic flooding from canals and raised reservoirs on plans. In particular, PPS 25 does not require flood risk from canals and raised reservoirs to be shown on the Environment Agency Flood Zones. Overflows from canals are common due to flows from land drainage and their frequent lack of overflows. Occasionally, major bank breaches also occur, leading to rapid and deep flooding of adjacent land.

Reservoirs with an impounded volume in excess of 25,000 cubic metres (measured above natural ground level) are governed by the Reservoirs Act and are listed on a register held by the Environment Agency. Due to high standards of inspection and maintenance required by legislation, flood risk from registered reservoirs is normally moderately low.

### 6.3.4 *Records of Groundwater Flooding*

Both the Environment Agency and the planning authority keep records of individual groundwater flooding events.

In some cases groundwater flooding is incorporated within the flood zones, at locations where its effect is not localised. This occurs at many locations within Hampshire, including the Winchester area (see further details in **Appendix A**).

### 6.3.5 *Records of Flooding from Other Sources*

Until 2006 methodologies for recording flooding from sources other than tidal and fluvial were not standardised, so records held of such flooding are neither complete nor to a uniform standard. As part of DEFRA's Making Space for Water study, a report was published by the Environment Agency titled "Flooding from other sources". The report recommended a classification for such flooding and methods for recording other sources of flooding. The classification approach has been adopted for this study.



Sources of information on flooding from other sources can be obtained from local government, highway authorities, the Environment Agency, sewerage undertakers, businesses, individuals and archives such as libraries.

The recording of flood instances by the authorities has often led to improvements intended to prevent recurrence, and hence historical flooding is not necessarily evidence of propensity for future flooding.

Currently few records of flooding from other sources contain sufficient detail to enable them to be classified in accordance with the Environment Agency classification of "flooding from other sources" and, indeed, many flood incidents had more than one cause.

The sources of flooding from the Environment Agency (Source report, JBA 2006) have been merged and are reproduced below.

Type	Flooding Phenomenon	Sources	Pathways	Receptors	Hazard
1	Direct runoff	Intense rainfall	All surfaces including road network	People, vehicles, properties, commercial, environment	Deep fast water, with high rate of inundation Deep water / debris / cellar flooding Fast water – erosion
2	Sewerage and drainage system flooding from pipe capacity exceedance	Heavy rainfall over a long duration or intense rainfall	Surcharging from manholes and openings in the drainage system. Surcharging	People, vehicles, properties, commercial, environment.	Cellar and ground floor flooding with water quality issues
3	Sewerage and drainage system flooding from 'other causes' (blockage and collapse)	Long duration or intense rainfall	Manholes and overflows in drainage and sewerage network	People, vehicles, properties, commercial, environment	Deep ponded water. Cellar and ground floor flooding with water quality issues
4	Restricted outlets from drainage systems due to high flood levels in the receiving watercourse	Heavy rainfall over long duration	All surfaces and drainage network	People, vehicles, properties, commercial	Deep ponded water, and water diverted along unexpected routes.
5	Surcharge from small (ordinary) and 'lost' watercourses	Heavy or intense rainfall	All surfaces and drainage network	People, vehicles, properties, commercial	Deep ponded water
6	Floodplain flooding from ordinary watercourses not covered by the flood map (catchment area > 3km <sup>2</sup> )	Heavy rainfall	Ordinary watercourse embankments and floodplains	People, vehicles, properties, commercial	Deep ponded water and fast flowing floodplain flows.
7	Intense rainfall leading to overland flow including mud/debris flow and flow along old drainage lines, roads and railways.	Intense rainfall or long duration heavy rainfall	Land, field drainage, river and watercourse network	People, vehicles, properties, commercial, environment	Fast water erosion of soil for high grade agricultural land. Rapid rates of inundation affect road users. Runoff from land on urban fringe to flood properties
8	Heavy, long duration rainfall leading to ponding on for example roads or fields	Long duration heavy rainfall	Rural surfaces and field drainage	People, vehicles, properties, commercial, environment	Deep water, runoff from fields onto rural roads can cause serious hazard to drivers
9	Changes to drainage or land management. Reduction in agricultural pumping / land use management / drainage leading to increased risk of flooding	Loss of pumping / irrigation	Field drains, drift geology, watercourses and land surface	People, properties, environment	Reduction in capacity of land to drain water away – leading to ponding and or more surface runoff and erosion. Await findings of FD2120 (DEFRA document).

Table 1: Sources of Flooding

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## 6.4 Production of Flood Maps

### 6.4.1 Current Flood Maps (without climate change allowance)

The March 2007 Environment Agency Flood Zones have been used for the production of the SFRA Flood Maps (see **Tiles A to F**). The draft maps included a combination of Environment Agency Flood Zones and Flood Maps originating from the CFMP scoping studies. The Environment Agency has now reviewed these and has agreed to the recommendation that the Environment Agency Flood Zones should be used in preference. This is a precautionary approach as CFMP outlines are based on coarse assessments.

Further updates are likely to occur, for example following the Flood Warning study for Winchester, and the Level 2 SFRA that is to be carried out within the Partnership for Urban South Hampshire area. Once the Environment Agency approves these studies, both the SFRA Flood Maps and the Environment Agency Flood Zones can be updated. SFRAs are living documents and, in order to ensure consistency, at least the digital flood maps should be updated in conjunction with Environment Agency Flood Zone updates.

The scale of the Flood Maps is 1:25 000 to give a strategic overview and reasonable clarity of general features.

As discussed in **Section 4.2**, the functional floodplain covers flooding that occurs frequently, so it may in some cases be possible to estimate its extent based upon historical data. However, there is insufficient data to determine this for the whole Winchester area, and as this method is complex and time-consuming it is not generally appropriate for a Level 1 SFRA.

In the absence of sufficient historical data or modelling work, a precautionary principle was adopted where it was assumed that Zone 3b covers all of Zone 3. In this case Zone 3a is represented in the flood maps merely as an outline since it is subsumed completely by the functional floodplain (Zone 3a + Zone 3b = Zone 3). In relation to development planning (see **Chapter 9**) Zone 3b only permits water compatible and essential infrastructure land uses so in the event that the Sequential Test leads to a more vulnerable development being considered for a Zone 3 area, an Exception Test should be applied with a more detailed, Level 2 assessment to

distinguish between Zones 3a and 3b.

Flooding incident records are maintained by Winchester City Council (see **Tiles A to F**) and these provide valuable information of previous incidents. Following occurrence of localised flooding, the authorities may have taken steps to mitigate flooding, and thus historical events are not necessarily indicative of future flooding.

As mentioned in **Section 6.2**, valuable information for main localised flooding areas (see **Tiles A to F**) was obtained from the drainage specialists working for Winchester City Council and Hampshire County Council. These are based on the main flood incident records where the risk is still present. This information in most cases complements the non-localised information provided by the flood zones and the information provided by Southern Water (indicated as separate points in the Flood Maps).

The Environment Agency also maintains flood incident records, however, these mainly relate to groundwater incidents and those that occur in the vicinity of main rivers. These have not been included in the map tiles to minimise duplication. The Environment Agency should, however, be consulted in relation to the flood incident records during the application of the Sequential Test, as explained in **Section 9.2**.

In some cases the flood zones and the localised flooding areas overlap, particularly at locations where there is a combination of forms of flooding (for example high groundwater combined with high intensity surface runoff). In limited cases there is also an overlap due to a dual interpretation of a form of flooding which may be considered to be both localised as well as part of a flood zone (due to its high significance, as it is the case for groundwater flooding in Hampshire).

#### 6.4.2 *Effects of Climate Change*

In October 2006, DEFRA published a document identifying the climate change impacts to be considered in undertaking flood risk appraisals in the United Kingdom. The document sets out how short duration rainfall could increase by 30% and flows by 20%, and suggests winters will become generally wetter. These effects will tend to increase both the size of flood zones and the amount of flooding experienced from "other sources".

The Climate Change Table B.2 from PPS 25 is shown below:

Parameter	1990 to 2025	2025 to 2055	2055 to 2085	2085 to 2115
Peak rainfall intensity	+5%	+10%	+20%	+30%
Peak river flow	+10%	+20%		
Offshore wind speed	+5%		+10%	
Extreme wave height	+5%		+10%	

**6.5 Climate Change Flood Maps**

Based on the climate change predictions with increases in peak flows by 20%, the following precautionary rules/assumptions have been adopted for the fluvial reaches (considered to be reasonable for a Level 1 SFRA):

C1) 'Climate Change' functional floodplain = Current Flood Zone 3

C2) 'Climate Change' Flood Zone 3 = Current Flood Zone 2

C3) 'Climate Change' Flood Zone 2 = Current Flood Zone 2 (as there is little certainty about the effect that climate change will have on very extreme fluvial events).

The current flood maps (**Tiles A to F**) can therefore be used to take account of climate change predictions along the fluvial reaches by applying rules C1, C2 and C3.

Many previous flood mapping studies by Halcrow confirmed that increases in flows by 20% (the expected increase between years 2025 to 2115, see PPS 25 table above) to Flood Zone 3, result in flood extents which are in general smaller than Flood Zone 2. As recommended by the Environment Agency, it has been assumed that commercial and residential developments of the LDFs will reach the end of their life span in years 2070 and 2115 respectively.

## 7 Flood Risk in the Study Area

### 7.1 Introduction

All forms of historical flooding have been considered, both in isolation and when occurring at the same time. For references to locations within the study area see the set of maps, **Tiles A to F**.

### 7.2 Geology and Hydrology

#### 7.2.1 Geology

The majority of the District of Winchester is underlain at a shallow depth by Upper Chalk. This rock is predominant in the north and the central parts of the study area, and reappears in the downs to the south of Southwick. The geological succession dips towards the south and east. Surface rocks nearest the coast generally are tertiary.

#### 7.2.2 Hydrology

The District of Winchester has an area of about 661 square kilometres. In the Upper Chalk areas permanent watercourses are absent in all except the deepest valleys. Upper Chalk is a major aquifer capable of absorbing large amounts of rainfall and releasing it slowly over a long period. This buffering effect together with the mainly rural nature of the Upper Chalk area means that the Test, Itchen and Meon river systems, which are mainly spring fed by the chalk aquifers, have relatively narrow ranges of flows in a normal year and generally do not flood in response to short to medium duration heavy rainfall.

After prolonged rainfall the water table in the Upper Chalk aquifer can rise to the ground surface causing springs to erupt in the valley floors and the creation of ephemeral watercourses. These effects can lead to “groundwater flooding” lasting for several months in the late parts of very wet winters. Public supply and agricultural water abstraction from the Upper Chalk tends to increase the Upper Chalk’s buffering effect, thereby suppressing the frequency at which ephemeral watercourses and springs occur. However, when the water table is sufficiently high for the aquifer to flow freely into the valleys, the run off from the Upper Chalk can be similar to that from a generally impermeable catchment. Snow melt and rainfall on a frozen Upper Chalk catchment also can lead to rapid surface water run off to the river system and widespread valley flooding.

In contrast, in the Hamble river system, where there is significant development, the geology is mainly tertiary and surface deposits have generally low permeability, causing this river to have a fairly “flashy” response to rainfall.

The other principal main river system serving the District, the River Wallington, has a combination of a large chalk upper catchment containing few permanent watercourses, a large urban catchment and a tertiary lower catchment. The flow characteristics of this river system are dominated by development runoff and the low permeability of the tertiary rocks and overlying soils in the southern part of the catchment. As a result the River Wallington responds rapidly to rainfall.

The names of all the main rivers within the study area are annotated on **Tiles A to F**.

### **7.3 Historical Flooding**

#### **7.3.1 Introduction**

This Section is to be read in conjunction with **Tiles A to F** and **Tables 2 and 3**. These tables include sewerage related flooding incident data for the years 1997-2006 supplied by Southern Water and general flood problem locations supplied by Winchester District Council. The flood locations are shown on the tiles, and annotated with a reference to the tables

A set of reports on predominantly groundwater caused flooding in 2000/2001 and 2002/3 prepared by the Halcrow Group are referred to throughout this section. These reports are not appended and the flood locations are not appended nor shown on the tiles. The reports may be obtained in Acrobat PDF format on CD by written application to External Relations at the Colden Common office of the Environment Agency.

A large flooding data set called F\_events held by the Environment Agency was reviewed during the preparation of this report. As most of the flood locations are within the fluvial flood plain and the size of the data set makes it difficult to accurately describe, it was decided not to include the details in the SFRA.

#### **7.3.2 Notable Flood Events**

A brief history of significant flood events is set out below.

1916 – Groundwater/chalk river flooding.



1935 – Groundwater/chalk river flooding.

1965 – Groundwater/chalk river flooding.

Early 1994 – Flooding at Exton, Botley Mill, Hambledon, Hursley.

Early 1995 – Flooding at Hursley, Kings Worthy and Wonston.

24 December 1999 – Flash flooding of Sorrell Drive, Whiteley .

Winter of 2000-2001 - exceptionally high cumulative rainfall, causing considerable spring activity and very high flows in the chalk river systems, including along valley floors that normally are dry, leading to extensive flooding. Winter of 2002-2003 – Flood levels almost at 2000-2001 levels in some places, for similar reasons.

17 November 2006 – Flooding at Bishop's Waltham, Waltham Chase and Winchester as a result of prolonged heavy rainfall.

26-29 November 2006 – Sewerage induced flooding at Fishers Pond, Colden Common and Otterbourne as a result of prolonged heavy rainfall.

### 7.3.3 *Groundwater Flooding*

Halcrow Group prepared reports for groundwater flooding in 2000-2001 for:

Bishops Sutton, Bishops Waltham, Bramdean, Chilland, Martyr Worthy and Easton, Denmead, Droxford, Exton, Hambledon, Headbourne Worthy, Hensting and Fishers Pond, Hursley, Kings Worthy, Littleton, Meonstoke and Corhampton, Old Alresford, Owlesbury, Shedfield, Shirrel Heath and Waltham Chase, Soberton, Southwick, Stoke Charity – Wonston – Sutton Scotney, Titchfield, Upham, Warnford, West Meon, West Stratton and Micheldever, Wickham and Winchester.

2002-2003 groundwater flooding reports by Halcrow Group are available for:

Bishops Sutton, Bramdean, Cheriton, Droxford, Exton, Meonstoke, Old Alresford and Soberton.

It should be noted that these reports cover both groundwater and fluvial flooding in each parish investigated. In many cases it is not easy to differentiate between groundwater and fluvial flooding causes.

Localised flooding areas recorded in **Table 3** for which groundwater was a contributory factor are W001 (**Tile C**, Otterbourne), W003 (**Tile C**, Bow Lake), W026 (**Tile C**, Littleton STW), W011 (**Tile D**, New Alresford) and W002 (Durley, **Tile E**).

#### 7.3.4 *Flooding shown on Environment Agency's Formal Flood Map*

Flood Zones shown on the Environment Agency's formal flood map are reproduced on **Tiles A to F**. Coastal and estuarial Flood Zone 3 represents the 1:200 year event, and on non tidal parts of rivers, Flood Zone 3 represents the 1:100 year event. Flood Zone 2 represents the 1:1,000 year event.

#### 7.3.5 *Fluvial Flood Events within Tile A*

The River Dever at Micheldever, Stoke Charity, Wonston and Sutton Scotney flooded in 2000/2001, as described in the Halcrow Group reports.

There is a Halcrow Group report for flooding at Old Alresford in 2000-2001 and 2002-2003.

Although the Candover Stream flooded extensively in 2000-2001, the section on **Tile B** is not covered by the Halcrow Group reports.

#### 7.3.6 *Fluvial Flood Events within Tile C*

Halcrow Group reports describe Fluvial flooding experienced from the Lower Itchen (which commences at Easton) during unusually high flows in the winter of 2000-2001 (Halcrow Group reports on Winchester, Easton and the Worthys refer). Most of this flooding occurred within fluvial Flood Zone 3.

Flooding at Littleton, Hensting and Fisher's Pond, Owlesbury, Twyford and Hursley in 2000-2001, described in the Halcrow Group reports, generally occurred on ephemeral watercourses.

**Table 3** flood location W0019 at Winchester is associated with high river levels.

#### 7.3.7 *Fluvial Flood Events within Tile D*

This tile includes the Upper Itchen and the upper Meon. Significant flooding occurred in 2000-2001 at Bishops' Sutton, Cheriton and Bramdean on the Upper Itchen and Meonstoke and Corhampton, Exton, Warnford and West Meon on the upper Meon, as reported on by the Halcrow Group. 2002-2003 flooding at Bramdean, Cheriton, Bishop's Sutton, Exton and Meonstoke is described also by Halcrow Group.

**Table 3** reference W009 (West Meon) relates to flooding mainly attributable to a high river levels.

**7.3.8** *Fluvial Flood Events within Tile E*

Fluvial flooding at Bishop's Waltham, Shedfield, Shirrel Heath and Waltham Chase, Titchfield, Upham and Wickham in 2000-2001 is described in the set of Halcrow Group reports.

**Table 3** flood location W023 at Wickham is associated with high river levels.

**7.3.9** *Fluvial Flood Events within Tile F*

Individual reports for 2000-2001 fluvial flooding were prepared by Halcrow Group for Denmead, Hambledon, Soberton, and Southwick.

A similar report was prepared for 2002-2003 flooding at Soberton.

**7.3.10** *Flooding from Other Sources*

Although extensive records of flooding from other sources have been obtained as part of the research for this report, these records, (summarised in **Tables 2 and 3**) should not be considered a complete record of such flooding.

Southern Water describe all the sewerage flooding incidents listed in **Table 2** as having "hydraulic" problems and as a "foul/combined" type. As the locations of all the incidents are clear from the tiles and **Table 2**, and no additional information has been made available, the incidents are not described further.

**7.3.11** *Flooding from Other Sources – Tile A*

Winchester City Council did not supply any records of flooding within the area covered by this tile.

**7.3.12** *Flooding from Other Sources – Tile B*

Winchester City Council did not supply any records of flooding within the area covered by this tile.

**7.3.13** *Flooding from Other Sources – Tile C*

Of the localised flooding areas within **Tile C** in **Table 3**, W005 (Easton), W018 (Winchester) and W0020 (Winchester) are wholly attributable to "flooding from other sources". "Other sources" were partially responsible for flooding at locations W008 (Otterbourne) and W019 (Winchester).

#### 7.3.14 *Flooding from Other Sources – Tile D*

In **Table 3**, flood locations W007 (West Meon) and W010 (Cheriton) are noted as having “other sources” causes of flooding.

Location W011, New Alresford, has flooded mainly as a result of groundwater, but Winchester City Council also note land drainage as a cause.

#### 7.3.15 *Flooding from Other Sources – Tile E*

All the flood locations on **Tile E** shown in **Table 3** (W002 at Durley, W012 at Waltham Chase, W014 & W016 at Upham, W015 & W022 at Bishop's Waltham and W016 at Curdridge) list “other sources” as a contributory cause.

#### 7.3.16 *Flooding from Other Sources – Tile F*

In **Table 3**, flooding at locations W004 (Waterlooville), W006 (Whiteley), W013 (Denmead) and W024& W025 (Wickham) is attributable to “other sources”.

Surface water run off from the M27 during a downpour contributed to flooding from Whiteley Stream at Whiteley. A balancing pond built by a commercial developer at the southern boundary of the development area should help to prevent, or ameliorate, repeat flooding.

### 7.4 **Areas Where Development May Increase Flood Risk Elsewhere**

The study of flood risk in this Chapter leads to the following conclusion: the comprehensive records of flooding kept by Winchester City Council demonstrate that careful investigation of local flood risk (with a detailed investigation of flood incident records, management and maintenance issues) is required at most locations in the SFRA area before development is allocated.

It is not sufficient to assume that siting development away from Flood Zones 2 and 3 and localised flooding areas and the use of sustainable drainage systems (SUDS) techniques will automatically render flood risk to third parties adequately low irrespective of location (see **Section 11.4**). A situation may arise in which there is no spare capacity at an outfall (for example a surface water drainage system a few kilometres from the proposed allocation). The approach could be to produce a specific policy in which development will not take place until the surface water drainage system is upgraded (unless an alternative outfall is identified and subject to approval by the planning authority and the Environment Agency).

A general policy for localised flooding issues could be as follows: 'No development will be allowed unless it is demonstrated that (a) dry access and egress is provided (see **Section 10.4**), (b) the outfall system has sufficient capacity (independent of the SUDS proposals) and (c) flood risk does not increase nearby localised flooding areas and/or flood incident locations.

## 8 CFMP, SMP, Flood Management Measures and Flood Warning Systems

### 8.1 Introduction

SFRA reports are 'living documents' which should be updated when Environment Agency flood zones and other relevant documents (for example SMPs, CFMPs, Strategies, Flood Warning Systems) are updated. It ensures a consistent and integral approach to flood risk management.

### 8.2 CFMPs

As mentioned in Section 6.2, only the scoping stage of the CFMPs has been completed. It has been considered reasonable in the meantime, to adopt Thames CFMP policies that apply to similar catchments to the study area. It is possible to base the proposed policies from those related to Thames CFMP catchments with 'Narrow flood plains and mixed land use' (see summary at <http://www.environment-agency.gov.uk/yourenv/consultations/1695546/1696092/>). The proposed main policy and implementation are:

Main Message	CFMP/SFRA Implementation
PPS25 provides the policy framework to make sure that flood risk is considered in new developments. There does not need to be a radical change in the way the risk is managed in these areas. The aims are to continue to maintain watercourses, increase flood awareness and provide appropriate flood warnings.	Make sure that the flood risk is managed appropriately in these areas by applying PPS25. The aims of PPS25 are to ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas at highest risk. There may be exceptional circumstances where new development is necessary. In such areas, policy aims to make it safe without increasing the risk elsewhere and, where possible, to reduce the overall flood risk. Structural works may be required to reduce flood hazard within acceptable limits at Level 2 SFRA locations.

The major source of flooding for 'Narrow flood plains and mixed land use' is fluvial flooding, but it is often a combination of this and high groundwater levels. Many of the tributaries are heavily dependent on groundwater to maintain flows throughout the year. Because groundwater tends to react slowly to changes in rainfall, groundwater flooding can last for long periods of time.

It is important to note that CFMP policies consider a 100 year horizon and the planning authority should consider locations where these can be implemented, in the short, medium and long term.

### **8.3 Flood Management Measures and Flood Warning Systems**

The Environment Agency operates an effective flood warning service within the study area in respect to main river flooding and tidal flooding from the sea (for further details about this service see the Environment Agency website at <http://www.environment-agency.gov.uk/subjects/flood/826674/829803/946278/?lang=e>).

The flood warning system consists of the following codes, with the following meanings:

- Flood Watch - Flooding of low lying land and roads is expected. Be aware, be prepared, watch out!
- Flood Warning - Flooding of homes and businesses is expected. Act now!
- Severe Flood Warning - Severe flooding is expected. There is extreme danger to life and property. Act now!
- All Clear - Flood Watches or Warnings are no longer in force for this area.

Further improvements to the flood warning service is being investigated by developing hydrological/hydraulic models that can predict flooding up to six hours prior to the event occurring. Halcrow has for example recently completed a flood forecasting model for Lymington and Brockenhurst. These models use rainfall estimates from the Met Office. The aim is to provide targeted flood warning at least 2 hours prior to events occurring.

Currently none of the potential land allocations are being considered for other possible uses, such as Flood Risk Management Schemes (storage areas, raised walls, etc) by the Environment Agency or others.

## 9 Guidance on the Application of the Sequential Test

### 9.1 Introduction

This chapter provides guidance on the application of the Sequential Test in the preparation of LDDs, based on the advice provided by the Environment Agency (James Addicott).

### 9.2 First Step – Strategic Overview of Flood Risk for all Potential Areas

The recommended initial step is to determine the extents of potential land allocations in large scale maps showing the most up-to-date flood zones, in accordance with PPS 25 (areas to be drawn in the SFRA Flood Maps - **Tiles A to F**). Summary tables of flood risk issues are then prepared for each location, indicating if the potential areas overlap Zones 2, 3, localised flooding areas or if there are records of previous flood incidents shown in the maps. It is then recommended that the summary tables and proposed locations are sent to the Environment Agency to obtain further details about Environment Agency flood incident records within those areas. As mentioned in **Section 7.5**, particular care should be taken by identifying allocations that could increase flood risk elsewhere (flood incident points, localised flooding areas, flood zones) and lack of dry access.

### 9.3 Second Step – Flood Risk Issues in Zone 1

The next step is to analyse all potential sites within Zone 1 by identifying those that have any flood risk issues (for example those affected by other sources of flooding or those that do not have dry access routes during flood events).

For the sites with flood risk issues, an assessment of likely significance of flood risk is then carried out in terms of likely probability of flooding and potential consequences/flood damages (advice from a drainage specialist may be required, such as the SFRA consultant, the Environment Agency, a highways drainage engineer and/or the planning authority drainage specialist). The purpose is to identify sites with significant flood risk - high probability of flooding and significant flood damages with deep flooding and high velocities which could result in loss of property and potentially loss of life.

If a site with significant flood risk is identified within Zone 1, this would be considered as if it was in the High Probability Zone 3a, for further application of the Sequential



Test in Zone 3a (see **Section 9.4**), bearing in mind that if a more vulnerable land use is required for the site, it will have to pass the Exception Test (see PPS 25 Flood Risk Vulnerability and Flood Zone Compatibility table in the tiles).

For those sites within localised flooding areas or with flood incident records where the flood risk issues are not significant (for example shallow flooding and non-frequent blockages, etc.), development should still be acceptable provided that adequate policies are in place for mitigating the risk (for example contributions may be required from the developer for the upgrade of the surface water system in the area).

It is important to note that most potential sites that pass the Sequential Test in Zone 1 will still require FRAs. For development proposals on sites comprising one hectare or greater, the vulnerability to flooding from other sources (as well as from river and sea flooding) and the potential to increase flood risk elsewhere through the addition of hard surfaces and the effect of the new development on surface water runoff, should be incorporated in a FRA. This need only be brief unless the factors above or other local considerations require particular attention. It is recommended that FRAs are still produced for Zone 1 sites of less than 1 hectare, at locations where there are records of previous flood incidents.

#### **9.4 Third Step – Sequential Test in Zones 2 and 3**

The third step is to sequentially allocate sites as described in **Section 5.3** and as part of a Sustainability Appraisal (SA). It is recommended that prior to incorporating the Sequential Test within the SA, the following actions take place:

- a) Apply the measure of avoidance/prevention (see **Section 5.5**) by moving the boundaries of the potential sites away from Zones 2, 3a and 3b, for those cases where the loss of site area is acceptable. This is generally the case at locations where the loss in area is of the order of 10%.
- b) Provisionally adopting land uses that are fully compatible with the vulnerability classification of PPS 25 to try to avoid the need to apply the Exception Test where possible.

## 10 Guidance for the preparation of Flood Risk Assessments

### 10.1 Introduction

A SFRA is a strategic document that provides an overview of flood risk throughout a study area. Flood Risk Assessments will be required for most proposed developments and the level of detail will depend on the existing level of flood risk in the site (see general FRA requirements for each flood zone in Table D.1, PPS 25 and further guidance in the Practice Guide Companion to PPS 25).

It is imperative that site-based Flood Risk Assessments (FRAs) should be discussed early in the planning process and submitted as an integral part of the planning application. It is now a government directive that planning applications seeking approval for development within flood affected areas can be regarded as invalid if not supported by a Flood Risk Assessment. The following section reflects best practice on what should be addressed within a FRA:

### 10.2 Proposed Developments within Flood Zone 3a and 2

All FRAs supporting proposed development within High Probability Zone 3a and 2 (as the existing Flood Zone 2 could become a high risk zone in the future due to the effects of climate change) should include an assessment of the following:

- The vulnerability of the development to flooding from other sources (for example surface water drainage, groundwater, etc) as well as from river/tidal flooding. This will involve discussion with the planning authority and the Environment Agency to confirm whether a localised risk of flooding exists at the proposed site.
- The vulnerability of the development to flooding over the lifetime of the development (including the potential impacts of climate change), for example maximum water levels, flow paths and flood extents within the property and surrounding area. The Environment Agency may have carried out detailed flood risk mapping within localised areas that could be used to underpin this assessment. Where available, this will be provided at a cost to the developer. Where detailed modelling is not available, hydraulic modelling by suitably qualified specialists will be required to determine the risk of flooding to the site.
- The potential of the development to increase flood risk elsewhere through the addition of hard surfaces, the effect of the new development on surface water

runoff, and the effect of the new development on depth and speed of flooding to adjacent and surrounding property. This will require a detailed assessment, to be carried out by suitably qualified specialists. The use of SUDS techniques can help mitigate the risks posed by the new development.

- A demonstration that residual risks of flooding (after existing and proposed flood management and mitigation measures are taken into account) are acceptable. Measures may include flood defences, flood resistant and resilient design, escape/evacuation, effective flood warning and emergency planning.
- Details of existing site levels, proposed site levels and proposed ground floor levels. All levels should be stated relevant to Ordnance Datum.

It is highlighted that all forms of flooding need to be considered as localised flooding may also occur, typically associated with local catchment runoff following intense rainfall. A localised risk of flooding must be considered as an integral part of the detailed Flood Risk Assessment.

It is essential that developers thoroughly review the existing and future structural integrity of formal and informal defences, if present, upon which the development will rely (over the lifetime of the development), and ensure that emergency planning measures are in place to minimise risk to life in the unlikely event of overtopping or defence failure.

### **10.3 Proposed Development within Zone 1**

For all sites within Medium Probability Zone 1, unless the planning authority and the Environment Agency suggest otherwise, a high level FRA should be prepared based upon readily available existing flooding information, sourced from the Environment Agency and information contained in this SFRA. PPS 25 recommends that an FRA is carried out for development areas of 1 hectare or more. This recommendation has been extended to all development areas in the study area due to the extensive flood risk issues.

Within all areas, the risk of alternative sources of flooding (surface water, sewage, groundwater, etc) must be considered, and sustainable urban drainage techniques must be employed to ensure no worsening to existing flooding problems elsewhere within the area.

The SFRA provides specific recommendations with respect to the provision of sustainable flood risk mitigation opportunities that will address both the risk to life

and the residual risk of flooding to development within particular 'zones' of the area. These recommendations should form the basis for the site-based FRA (see **Section 10.5** and **Chapter 11**).

#### **10.4 Raised Floor Levels, Basements and Dry Access (Freeboard)**

The raising of floor levels above the 1% probability peak flood level will ensure that the damage to property is minimised. Given the anticipated increase in flood levels due to climate change, the adopted floor level should be raised above the 1% probability flood level assuming a 20% increase in flow over the next 20 to 100 years (see PPS 25 climate change Tables in **Section 6.4.2**).

It is highlighted that many of those areas currently situated within Medium Probability Zone 2 could become part of the High Probability Zone 3. This is important as it means that properties that are today at relatively low risk are likely to be, in 20 to 100 years, within High Probability Zone 3a (see precautionary assumption in **Section 6.4.2**). It is imperative therefore that planning and development control decisions take due consideration of the potential risk of flooding in future years.

Wherever possible, floor levels should be situated a minimum of 300 mm above the 1% annual probability peak flood level plus climate change flood level, determined as an outcome of the site-based FRA, or 600 mm above the 1% annual probability peak flood level if no climate change data is available. The height that the floor level is raised above flood level is referred to as the 'freeboard', and is determined as a measure of the residual risks.

The use of basements within flood affected areas should be discouraged. Where basement use is permitted, however, it is necessary to ensure that the basement access points are situated 300 mm above the 1% probability flood level plus climate change. The basement must have unimpeded access and be of waterproof construction to avoid seepage during flooding conditions. Habitable uses of basements within flood affected areas should not be permitted.

Dry access and egress is recommended above the 1% probability flood level plus climate change. It will facilitate, for example, easy access to emergency services, etc.

# 11 Guidance for the Application of Sustainable Drainage Systems

## 11.1 Introduction

PPS 1: Delivering Sustainable Development and PPS 25 require that LPAs should promote Sustainable Urban Drainage Systems (SUDS). LPAs should ensure policies encourage sustainable drainage practices in their Local Development Documents. SUDS is a term used to describe the various approaches that can be used to manage surface water drainage in a way that mimics the natural environment. The management of rainfall (surface water) is considered an essential element for reducing future flood risk to both the site and its surroundings. Indeed reducing the rate of discharge from urban sites to greenfield (undeveloped) runoff rates is one of the most effective ways of reducing and managing flood risk.

## 11.2 Types of SUDS Systems

SUDS may improve the sustainable management of water for a site by:

- controlling or reducing peak flows to watercourses or sewers and potentially reducing the risk of flooding downstream;
- reducing volumes of water flowing directly to watercourses or sewers from developed sites;
- improving water quality, compared with conventional surface water sewers, by removing pollutants from diffuse pollutant sources;
- reducing potable water demand through rainwater harvesting;
- improving amenity through the provision of public open space and wildlife habitat;
- replicating natural drainage patterns, including the recharge of groundwater so that base flows are maintained.

Any reduction in the amount of water that originates from a given site is likely to be small. However, if applied across a catchment, the cumulative effect from a number of sites could be significant.

There are numerous different ways that SUDS can be incorporated into a development. The appropriate application of a SUDS scheme to a specific development is heavily dependent upon the topography and geology of the site and

the surrounding areas. Careful consideration of the site characteristics is necessary to ensure the future sustainability of the adopted drainage system. The most commonly found components of a SUDS system are described below:

**Pervious surfaces:-** Surfaces that allow inflow of rainwater into the underlying construction or soil, such as porous provisions, avoidance of blacktop in car parks etc.

**Green roofs:-** Vegetated roofs that reduce the volume and rate of runoff and remove pollution.

**Filter drains:-** Linear drains consisting of trenches filled with a permeable material, often with a perforated pipe in the base of the trench to assist drainage, to store and conduct water; they may also permit infiltration.

**Filter strips:-** Vegetated areas of gently sloping ground designed to drain water evenly off impermeable areas and to filter out silt and other particulates.

**Swales:-** Shallow vegetated channels that conduct and retain water, and may also permit infiltration; the vegetation filters particulate matter.

**Basins:-** Ponds and Wetlands Areas that may be utilised for surface runoff storage.

**Infiltration Devices:-** Sub-surface structures to promote the infiltration of surface water to ground. They can be trenches, basins or soakaways.

**Bio-retention areas:-** Vegetated areas designed to collect and treat water before discharge via a piped system or infiltration to the ground

**Pipes and accessories:-** A series of conduits and their accessories, normally laid underground, that convey surface water to a suitable location for treatment and/or disposal (although sustainable, these techniques should be considered only where other SUDS techniques are not practicable).

For more guidance on SUDS, the following documents and websites are recommended as a starting point:

- PPS 25
- Practice Guide Companion to PPS 25
- Interim Code of Practice for Sustainable Drainage Systems, National SUDS Working Group, 2004
- Best practice guidance for Sustainable Drainage Systems from the Thames Region, providing a clear hierarchy for SUDS requirements at the planning

application stage (available from the Environment Agency development control teams).

- [www.ciria.org.uk/suds/](http://www.ciria.org.uk/suds/)

### 11.3 **Application of SUDS for the Proposed Allocation Sites**

It is recommended that priority is given to the use of infiltration drainage techniques as opposed to discharging surface water to watercourses. Where infiltration techniques are not viable (due to a high water table, local impermeable soils, source protection zones etc), discharging attenuated site runoff to watercourses is preferable to the use of sewers. An indication of soil hydrological properties in Winchester is illustrated in **Figure 3: Distribution of Soil Permeability**, which is based on the estimate of the Standard Percentage runoff from the Flood Estimation Handbook. Apart from the soil area highlighted in green (which has a SPR of 49.6%) the other soils areas are in principle sufficiently permeable to allow the infiltration of surface runoff.

### 11.4 **Effective application of SUDS techniques**

Large increases in impermeable areas contribute to significant increases in surface runoff volumes and peak flows and could increase flood risk elsewhere unless adequate SUDS techniques are implemented. This may even apply for developments within Zone 1 which, whilst they are not at risk of flooding themselves, may still increase the risk of flooding elsewhere.

A critical situation could be that of building a new large development just upstream of an existing development which already suffers from frequent flooding. The correct SUDS technique could, in this case, be to build large areas of pervious surfaces (pervious paving, etc) combined with infiltration and rainfall harvesting techniques. The use of large attenuation areas may not be the appropriate SUDS technique, as these attenuate peak flows but do not reduce flood volumes.

SUDS techniques will be required for most, if not all, proposed land allocations. The attenuation to 'greenfield' (undeveloped condition) discharge should be the norm and the method adopted will depend on the individual circumstances. Developers should consult with the Environment Agency at an early stage about their SUDS proposals, to ensure that they are adopting the most affective methods for their site.

