

Winchester City Council

Strategic Flood Risk Assessment for Local
Development Framework

Final

September 2007

Halcrow Group Limited



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Winchester City Council

Strategic Flood Risk Assessment for Local Development Framework

Contents Amendment Record

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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).

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:

Main Message	SFRA Implementations
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. The Environment Agency has fully reviewed this document and all issues have been addressed (see formal responses from the Environment Agency in Appendix C).

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 (see **Figure 1: Study Area**).

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 km² 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.

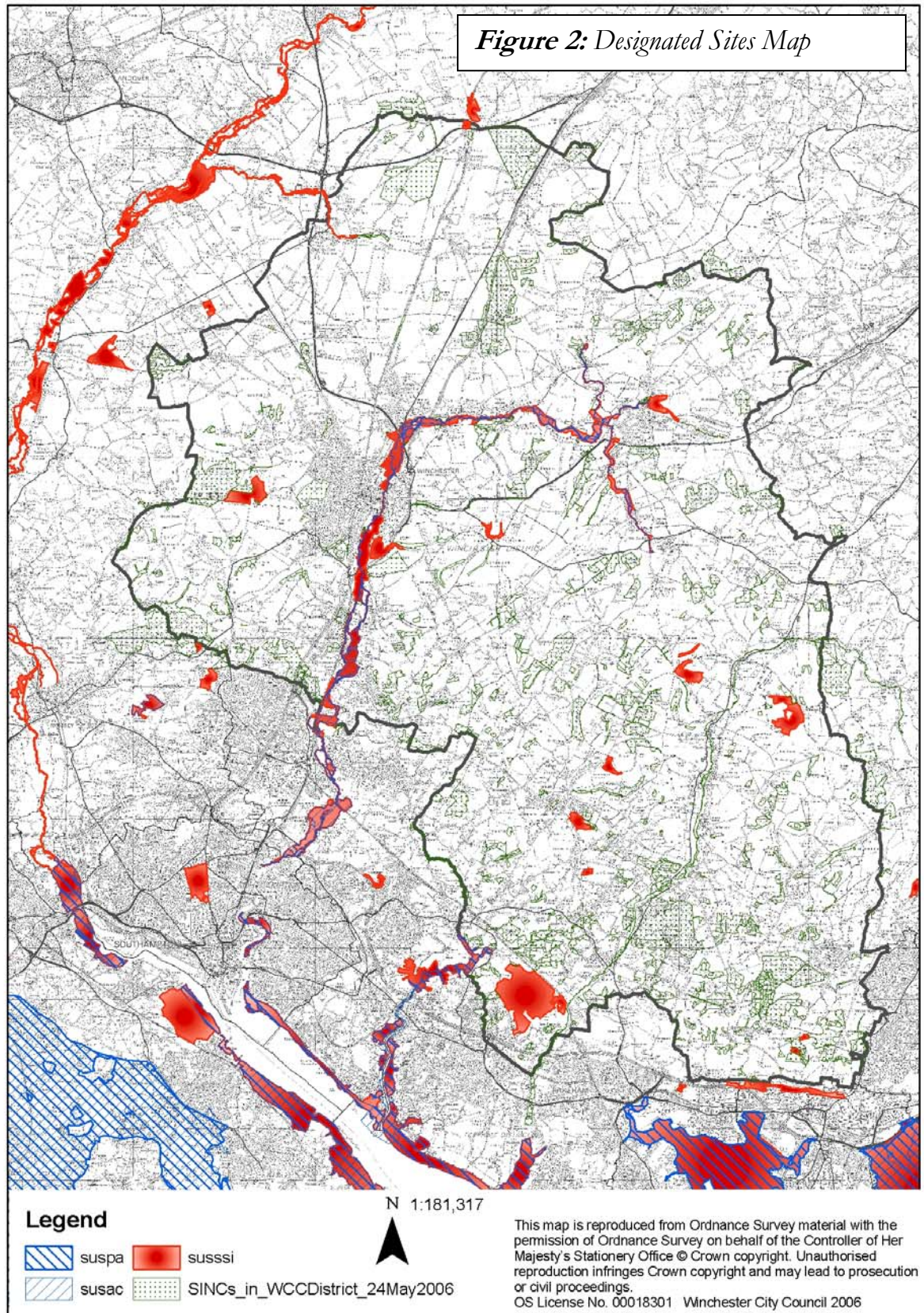
2.3 Constraints on development

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 (SSSIs) 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 (SACs) (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 locations of the above designated sites are illustrated in **Figure 2**.



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 being 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

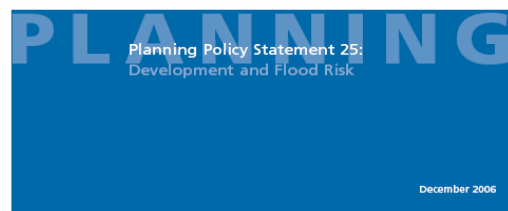
The Government has updated its planning advice contained within Planning Policy Guidance Notes (PPGs) with the publication of new style Planning Policy Statements (PPSs). As they are policy documents PPSs carry more weight than their predecessors.

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 LDFs 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.

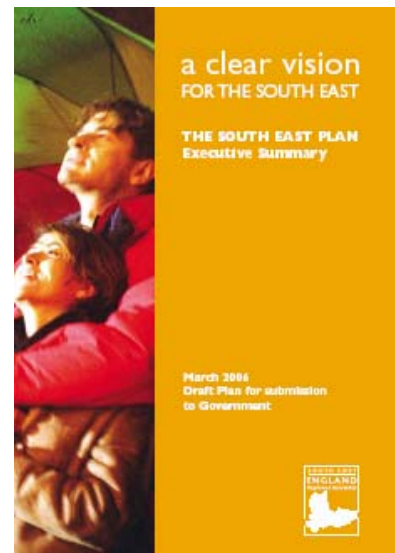
3.3 Regional Planning Policy

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.

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 of 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 LDFs 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), which 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. RBMPs will need to take into account existing studies and reports such as this Level 1 SFRA and the CFMPs 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 Flood Zones and 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 Planning Policy Statement 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 3: 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:

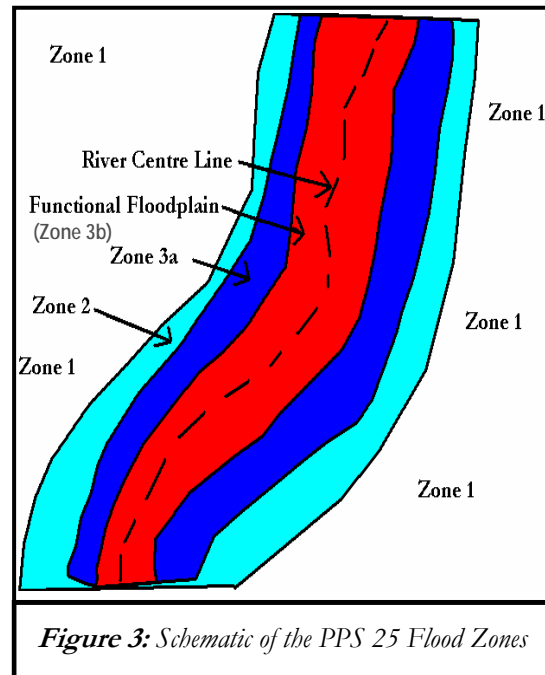


Figure 3: Schematic of the PPS 25 Flood Zones

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. 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 Strategic Flood Risk Assessment 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 (see **Tiles A to F**) which relate to historical flooding at individual locations. Their main form of flooding can be other sources of flooding (see **Section 6.3.5**) or mainly fluvial/groundwater or tidal combined with insufficient surface drainage, etc. The flood risk at localised flooding areas that fall in Zones 1 and 2 may in some cases be significant, with deep and frequent flooding. These areas could be considered as if they were high risk areas (equivalent to the fluvial/tidal Zone 3a) when applying the Sequential Test. See **Chapter 9**.

5 Planning Policy Statement 25 and its Practice Guide Companion

5.1 Planning Policy Statement 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 (RFRA) or Strategic Flood Risk Assessments (SFRA) 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 Strategic Flood Risk Assessment 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 but 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

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

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

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
Avoidance/Prevention	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 (RFRAs), Strategic Flood Risk Assessments (SFRAs), Flood Risk Assessments (FRAs) and application of the sequential approach	Planning bodies
Substitution	Substitute less vulnerable development types for those incompatible with the degree of flood risk		Planning bodies and developers
Control	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
Mitigation	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 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. Overtopping from canals is common due to flows from land drainage and their frequent lack of controlled overflow facilities. 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.

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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 ²)	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: Other Sources of Flooding

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6.4 Production of Flood Maps

6.4.1 Introduction

For a Level 1 SFRA (in accordance with the Practice Guide Companion to PPS 25), present day and climate change flood maps assume that defences are not in place. This is a reasonable pre-cautionary option for the application of the Sequential Test, as it gives priority to development areas that do not require the presence and maintenance of defences.

6.4.2 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. Their main form of flooding can be other sources of flooding (see Section 6.3.5) or mainly fluvial/groundwater or tidal combined with insufficient surface drainage, etc. The Flood Maps also provide information from Southern Water (indicated as separate points).

The Environment Agency also maintains flood incident records but 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**.

6.4.3 *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. In addition to sea level rise of approximately 1m in south east England over the next 100 years, the document also 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 associated with the sea and rivers, and the amount of flooding experienced from “other sources”.

During the life span of new commercial and residential developments, it is expected that peak river flows will first increase for a short period by 10% (2007-2025) and for the remaining period by 20%. The PPS 25 table below indicates that an increase of 20% in peak river flow is estimated between years 2025 and 2115.

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%	

As recommended by the Environment Agency, it has been assumed that commercial and residential developments planned in the LDFs will reach the end of their life in 2070 and 2115 respectively.

6.5 **Climate Change Flood Maps**

Based on an estimated increase of 20% in peak river flow (which is expected to occur during the life of the new commercial and residential developments, see **Section 6.4.3**) the following precautionary rules/assumptions have been adopted for this Level 1 SFRA:

C1) 'Climate Change' functional floodplain = Current Flood Zone 3 which can also be written as 'Climate Change' Zone 3b = Current Flood Zones 3a + 3b

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

Many previous flood mapping studies by Halcrow confirmed that increases in flows by 20% to Flood Zone 3, result in flood extents which are in general smaller than Flood Zone 2.

C3) 'Climate Change' Flood Zone 2 is slightly larger than Current Flood Zone 2 (as there is little certainty about the effect that climate change will have on very extreme fluvial events). It is reasonable to assume that these two Zones 2 (with and without climate change) are the same on the large scale SFRA flood maps.

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

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 are normally 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 also occurs in the

vicinity of chalk springs due to high groundwater levels and details are provided in the next sections.

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 receiving watercourse has sufficient capacity and c) flood risk will not be increased in nearby localised flooding areas and/or flood incident locations.

8 High Level Plans, 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 CFMPs, Strategies, Flood Warning Systems) are updated. It ensures a consistent and integral approach to flood risk management.

8.2 Catchment Flood Management Plans

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 flood plain is defined as Zone 3 without taking account of the effect of defences, whereas the functional floodplain is Zone 3b only. The proposed main policy and implementation within the flood plain are:

Main Message	CFMP/SFRA Implementation
<p>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.</p>	<p>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 to within acceptable limits at Level 2 SFRA locations.</p>

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 SFRAs should consider how to implement these, in the short, medium and long term.

8.3 **Flood Warning Systems and Future Flood Risk Management Schemes**

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 there are no areas that could be potentially allocated for Flood Risk Management Schemes by the Environment Agency or others. If such areas were identified, they would be considered as spatial constraints to development proposals).

9 Guidance on the Application of the Sequential Test

9.1 Introduction

As described in Chapter 5, the application of the Sequential Test can be summarised as follows:

- to look for sites in areas at least risk from flooding (Zone 1), only making allocations in Zones 2 or 3 if there were no alternatives,
- within Zones 2 and 3, give preference to Zone 2, with Zone 3 only being used as a last resort and
- for sites in Zones 2 and 3, to apply the Exception test as required, as set out in PPS25.

The following Sections/Steps provide additional guidance to that from PPS 25 and its Practice Guide, and have been produced in consultation with the Environment Agency (James Addicott). They provide details on how to take account of other sources of flooding (and not just the Flood Zones) during the application of the Sequential Test, and as part of a Sustainability Appraisal.

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

The recommended initial step is to determine broad 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 – Analysis of Flood Risk Issues

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). This step is carried out as part of the Sequential Test for Zone 1 (ideally the land uses most vulnerable to flood risk should be located in Zone 1).

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 (or within a 100m radius), 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).

9.4 Third Step – Apply the Measures of Avoidance/Protection

It is recommended that the following actions take place prior to the application of the Sequential Test in Zones 2 and 3:

- 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) Within Zones 2 and 3, provisionally adopt 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.

9.5 Fourth Step – Apply the Sequential Test in Zone 2

The fourth step is to take account of localised flooding areas as indicated for Zone 1 (see **Section 9.3**) and as part of the Sequential Test in Zone 2.

9.6 Fifth Step – Apply the Sequential Test in Zone 3

The fifth step is to apply the Sequential Test in Zone 3, and where required the Exception Test in accordance with PPS 25. This applies to all potential sites that fall within Zone 3 as well as those that encroach or are located within a 100m radius from a high risk 'localised flooding area' in Zones 1 and 2.

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).

For those sites within localised flooding areas or with flood incident records where 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. Options range from using on site water balancing and other SUDS solutions, and may include contributions from the developer for the upgrade of the surface water system, if feasible.

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 Zones 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 low 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, the local planning authority and information contained in this SFRA). PPS 25 recommends that an FRA is carried out in Zone 1 for development areas of 1 hectare or more. The PPS25 recommendation has been extended in this SFRA to development areas less than 1 hectare, due to the extensive flood risk issues within the study area.

The following issues should be considered: a) the vulnerability to flooding from other sources (as well as from river and sea flooding), b) the potential to increase flood risk elsewhere through the addition of hard surfaces and c) the effect of the new development on surface water runoff. It is recommended that sustainable urban drainage techniques are 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 10.4** 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. For further information on methods used for the estimate of greenfield runoff and the management of rainfall runoff in developments, see September 2005, DEFRA/Environment Agency Interim document - R&D Technical Report W5-074/A/TR/1 Revision C.

11.2 Types of Sustainable Drainage 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).
- Preliminary management of rainfall runoff - September 2005, DEFRA/Environment Agency Interim document - R&D Technical Report W5-074/A/TR/1 Revision C.
- www.ciria.org.uk/suds/

11.3 **Application of Sustainable Drainage Systems for 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 4: 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 Sustainable Drainage 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.