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PLANNING

Planning Policy Statement 25:
Development and Flood Risk



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Planning Policy Statement 25: Development and Flood Risk

Planning Policy Statements (PPS) set out the Government's national policies on different aspects of land use planning in England. This PPS replaces Planning Policy Guidance Note 25: *Development and Flood Risk*, published in 2001, which is hereby cancelled.

The policies in this PPS should be taken into account by regional planning bodies in the preparation of Regional Spatial Strategies; by the Mayor of Greater London in relation to the Spatial Development Strategy in London; and, in general, by local planning authorities in the preparation of local development documents. They may also be material to decisions on individual planning applications. These policies complement other national planning policies and should be read in conjunction with Government policies for flood risk and water management, including those set out in *Making Space for Water* and forthcoming Water Framework Directive guidance.

A supporting Practice Guide will provide guidance on the implementation of the policies set out in this PPS.

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Background

1. Flooding from rivers and coastal waters is a natural process that plays an important role in shaping the natural environment. However, flooding threatens life and causes substantial damage to property. The effects of weather events can be increased in severity both as a consequence of previous decisions about the location, design and nature of settlement and land use, and as a potential consequence of future climate change. Although flooding cannot be wholly prevented, its impacts can be avoided and reduced through good planning and management.
2. Climate change over the next few decades is likely to mean milder wetter winters and hotter drier summers in the UK, while sea levels will continue to rise. These factors will lead to increased and new risks of flooding within the lifetime of planned developments.
3. All forms of flooding and their impact on the natural and built environment are material planning considerations. Planning Policy Statement 1: *Delivering Sustainable Development* sets out the Government's objectives for the planning system, and how planning should facilitate and promote sustainable patterns of development, avoiding flood risk and accommodating the impacts of climate change. The Planning Policy Statement *Planning and Climate Change*¹, provides expanded policy on planning's contribution to mitigating and adapting to climate change.
4. Positive planning has an important role in helping deliver sustainable development (see Annex A) and applying the Government's policy on flood risk management. It avoids, reduces and manages flood risk by taking full account in decisions on plans and applications of:
 - present and future flood risk, involving both the statistical probability of a flood occurring and the scale of its potential consequences, whether inland or on the coast; and
 - the wider implications for flood risk of development located outside flood risk areas.

¹ Planning Policy Statement: *Planning and Climate Change*, consultation December 2006

Key Planning Objectives

5. 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.
6. Regional planning bodies (RPBs)² and local planning authorities (LPAs) should prepare and implement planning strategies that help to deliver sustainable development by:

Appraising risk

- identifying land at risk and the degree of risk of flooding from river, sea and other sources in their areas;
- preparing Regional Flood Risk Appraisals (RFRAs) or Strategic Flood Risk Assessments (SFRAs) as appropriate, as freestanding assessments that contribute to the Sustainability Appraisal³ 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 eg 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 eg surface water management plans; making the most of the benefits of green infrastructure for flood storage, conveyance and SUDS; re-creating functional floodplain; and setting back defences;

² Regional Assemblies are recognised by the Secretary of State as the Regional Planning Body and Regional Housing Body with responsibility for preparing the Regional Spatial Strategy and Regional Housing Strategy for their region.

³ Under the Planning and Compulsory Purchase Act 2004, Sustainability Appraisal is required for Regional Spatial Strategies, Development Plan Documents and Supplementary Planning Documents. Sustainability Appraisal helps planning authorities to fulfil the objective of contributing to the achievement of sustainable development in preparing their plans. Guidance is available at www.communities.gov.uk/index.asp?id=1164579

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; and
- ensuring spatial planning supports flood risk management policies and plans, River Basin Management Plans and emergency planning.

Decision-making Principles

7. RPBs and LPAs should adhere to the following principles in preparing planning strategies:
 - RPBs should ensure their Regional Spatial Strategies (RSSs) include a broad consideration of flood risk from all sources and set out a strategy for managing it. This should be consistent with RFRAs and SFRAs, the policies in this PPS and Shoreline Management Plans, Catchment Flood Management Plans and River Basin Management Plans prepared by the Environment Agency under the Water Framework Directive;
 - LPAs should prepare Local Development Documents (LDDs) 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, reflecting the approach to managing flood risk in this PPS and in the RSS for their region;
 - where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long-term, LPAs should consider whether there are opportunities in the preparation of LDDs to facilitate the relocation of development, including housing⁴ to more sustainable locations at less risk from flooding;
 - flood risk should be considered alongside other spatial planning issues such as transport, housing, economic growth, natural resources, regeneration, biodiversity, the historic environment and the management of other hazards. Policies should recognise the positive contribution that avoidance and management of flood risk can make to the development of sustainable communities, including improved local amenities and better overall quality of life. They should be integrated effectively with other strategies of material significance such as Regional Economic Strategies; and
 - the sustainability appraisal of RSSs and LDDs should incorporate or reflect the RPB's RFRA and the planning authority's SFRA, so as to ensure that the planning strategies for the area support the Government's objectives for development and flood risk set out in this PPS.

⁴ See Planning Policy Statement 3: *Housing* www.communities.gov.uk/index.asp?id=1504592

8. In addition, LPAs should in determining planning applications:
- have regard to the policies in this PPS and, as relevant, in the RSS for their region, as material considerations which may supersede the policies in their existing development plan, when considering planning applications for developments in flood risk areas before that plan can be reviewed to reflect this PPS;
 - ensure that planning applications are supported by site-specific flood risk assessments (FRAs) as appropriate;
 - apply the sequential approach (see paras. 14–17) at a site level to minimise risk by directing the most vulnerable development to areas of lowest flood risk, matching vulnerability of land use to flood risk;
 - give priority to the use of SUDS; and
 - ensure that all new development in flood risk areas is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed.

Risk-based Approach

9. A risk-based approach should be adopted at all levels of planning. Applying the source-pathway-receptor model to planning for development in areas of flood risk requires:
 - a strategic approach through policies in RSSs and LDDs which avoid adding to the causes or “sources” of flood risk, by such means as avoiding inappropriate development in flood risk areas and minimising run-off from new development onto adjacent and other downstream property, and into the river systems;
 - managing flood “pathways” to reduce the likelihood of flooding by ensuring that the design and location of the development maximises the use of SUDS, and takes account of its susceptibility to flooding, the performance and processes of river/coastal systems and appropriate flood defence infrastructure, and of the likely routes and storage of floodwater, and its influence on flood risk downstream; and
 - reducing the adverse consequences of flooding on the “receptors” (ie people, property, infrastructure, habitats and statutory sites) by avoiding inappropriate development in areas at risk of flooding.

Flood Risk Assessments

10. Flood risk assessment should be carried out to the appropriate degree at all levels of the planning process, to assess the risks of all forms of flooding to and from development taking climate change into account and to inform the application of the sequential approach.
11. A RFRA should inform the RSS, taking account of SFRA where available.
12. A SFRA should be carried out by the local planning authority to inform the preparation of its LDDs, having regard to catchment-wide flooding issues which affect the area. The SFRA will provide the information needed to apply the sequential approach (see paras. 14–17). Policies in LDDs should set out requirements for site-specific Flood Risk Assessments (FRAs) to be carried out by developers and submitted with planning applications in areas of flood risk identified in the plan, under circumstances set out in this PPS.
13. Minimum requirements for all levels of flood risk assessment are given in Annex E. Further guidance will be given in the Practice Guide to accompany this PPS.

The Sequential Approach

14. A sequential risk-based approach to determining the suitability of land for development in flood risk areas is central to the policy statement and should be applied at all levels of the planning process.
15. Regional Planning Bodies (RPBs) when developing Regional Spatial Strategies should apply the sequential approach when establishing locational criteria for regionally significant land uses, including the identification of broad locations.⁵ Local planning authorities should apply the sequential approach as part of the identification of land for development in areas at risk of flooding.

⁵ See para. 1.16-1.17 PPS11: *Regional Spatial Strategies* available at www.communities.gov.uk/index.asp?id=1143839

The Sequential Test

16. LPAs allocating land in LDDs for development should apply the Sequential Test (see Annex D and Table D.1) to demonstrate that there are no reasonably available sites in areas with a lower probability of flooding that would be appropriate to the type of development or land use proposed. A sequential approach should be used in areas known to be at risk from other forms of flooding.
17. In areas at risk of river or sea flooding, preference should be given to locating new development in Flood Zone 1.⁶ If there is no reasonably available site in Flood Zone 1, the flood vulnerability of the proposed development (see Table D.2, Annex D) can be taken into account in locating development in Flood Zone 2 and then Flood Zone 3. Within each Flood Zone new development should be directed to sites at the lowest probability of flooding from all sources (see Annex C) as indicated by the SFRA.

The Exception Test

18. If, following application of the Sequential Test in Annex D, it is not possible, consistent with wider sustainability objectives, for the development to be located in zones of lower probability of flooding, the Exception Test can be applied as detailed in paras. D9–D14. The Test provides a method of managing flood risk while still allowing necessary development to occur.
19. 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, eg 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.
20. Where use of the Exception Test is required, decision-makers should apply it at the earliest stage possible in planning, to all LDD allocations for development and all planning applications other than for minor development.⁷ All the three elements (see para. D.9, Annex D) of the test will have to be passed for development to be allocated or permitted.

⁶ Flood Zones are defined in Table D.1, Annex D. The Flood Zones refer to the probability of flooding from rivers, the sea and tidal sources and ignore the presence of existing defences, because these can be breached, overtopped and may not be in existence for the lifetime of the development.

⁷ Definition of minor development:

- Minor non-residential extensions: Industrial/Commercial/Leisure etc. extensions with a footprint less than 250 m².
- Alterations: development that does not increase the size of buildings eg alterations to external appearance.
- ‘Householder’ development: eg sheds, garages, games rooms etc. within the curtilage of the existing dwelling in addition to physical extensions to the existing dwelling itself. This definition EXCLUDES any proposed development that would create a separate dwelling within the curtilage of the existing dwelling eg subdivision of houses into flats.

Responsibilities

21. There is no general statutory duty on the Government to protect land or property against flooding. But the Government recognises the need for action to be taken to safeguard the wider social and economic wellbeing of the country, including adapting to the impacts of climate change. Operating authorities (see Annex H) have permissive powers but not a statutory duty to carry out or maintain flood defence works in the public interest.

The Owner/Developer

22. Landowners have the primary responsibility for safeguarding their land and other property against natural hazards such as flooding. Individual property owners and users are also responsible for managing the drainage of their land in such a way as to prevent, as far as is reasonably practicable, adverse impacts on neighbouring land. Those proposing development are responsible for:
- demonstrating that it is consistent with the policies in this PPS and those on flood risk in the LDD;
 - providing a FRA demonstrating:
 - whether any proposed development is likely to be affected by current or future flooding from any source;
 - satisfying the LPA that the development is safe and where possible reduces flood risk overall;
 - whether it will increase flood risk elsewhere; and
 - the measures proposed to deal with these effects and risks. Any necessary flood risk management measures should be sufficiently funded to ensure that the site can be developed and occupied safely throughout its proposed lifetime;
 - designs which reduce flood risk to the development and elsewhere, by incorporating sustainable drainage systems (see Annex F) and where necessary, flood resilience measures (see Annex G); and
 - identifying opportunities to reduce flood risk, enhance biodiversity and amenity, protect the historic environment and seek collective solutions to managing flood risk.
23. These matters can affect the value of land, the cost of developing it and the cost of its future management and use. They should be considered as early as possible in preparing development proposals.

The Regional Planning Body

24. The RPB should take flood risk into account in determining strategic planning considerations in the RSS for its region, including the criteria to be used for selecting and determining broad strategic locations for housing provision and transport infrastructure. Its RFRA should identify the risk to its regionally strategic locations. The RPB should consult the Environment Agency and other operating authorities on flood risk issues when preparing its RSS.

The Local Planning Authority

25. LPAs should consult the Environment Agency and other relevant bodies (including adjacent LPAs), when preparing policies in their LDDs on flood risk management and in relation to areas potentially identified as at risk of flooding. Their sustainability appraisals, land allocations and development control policies should all be informed by a SFRA carried out in liaison with the Environment Agency.
26. Following the coming into force, on 1 October 2006, of the amendment⁸ to Article 10 of The Town and Country Planning (General Development Procedure) Order 1995 (“the GDPO”), LPAs are required to consult the Environment Agency on all applications for development in flood risk areas (except minor development), including those in areas with critical drainage problems and for any development on land exceeding 1 hectare outside flood risk areas. Where the Environment Agency (or other organisations) object to an application on flood risk grounds, but the LPA considers that it should be approved, the LPA should contact the Environment Agency (or the other consultees if appropriate) to allow discussion of the case and the opportunity for further representations or comments to be made. LPAs, advised by the Environment Agency and other relevant organisations, should determine applications for planning permission taking account of all material considerations, including the issue of flood risk, the FRA prepared by the developer (when required) and proposals for reducing or managing that risk.
27. As noted above, the GDPO (as amended) covers all applications for development in flood risk areas (except minor development). If the Environment Agency objects to an application for major development⁹ on flood risk grounds, all parties (the LPA, the Environment Agency and the applicant), should discuss and agree the course of action which would need to be taken to enable the Environment Agency to withdraw its objection. There should be effective on-going liaison so that each party is aware at all stages in the process of the position of the others with regard to the application.
28. If, after discussions, it becomes clear that the Environment Agency is unable to withdraw its objection, but the LPA remains minded to approve an application for major development, the Town and Country Planning (Flooding) (England) Direction 2007 requires the LPA to notify the Secretary of State of the proposal. This provides the Secretary of State with an opportunity to check the application’s general compliance with the policies in this PPS and

⁸ Introduced by Statutory Instrument 2006 No.2375 “The Town and Country Planning (General Development Procedure) (Amendment) (No.2) (England) Order 2006”. Available at www.opsi.gov.uk/si/si2006/uksi_20062375_en.pdf

⁹ Major development is defined in The Town and Country Planning (Flooding) (England) Direction 2007 as:

- (a) in respect of residential development, a development where the number of dwellings to be provided is 10 or more, or the site area is 0.5 hectares or more; or
- (b) in respect of non-residential development, a development where the new floorspace to be provided is 1,000 square metres or more, or the site area is 1 hectare or more;

“flood risk area” means:

- (a) land in an area within Flood Zones 2 or 3; or
- (b) land in an area within Flood Zone 1 which has critical drainage problems and which has been notified for the purposes of article 10 of the Order (see footnote 6, above) to the local planning authority by the Environment Agency;

‘Flood zones’ has the same meaning as in document at footnote 8, above.

to consider whether it would be appropriate to call it in for determination. The Secretary of State would wish to be assured in considering such cases that all reasonable steps have been taken by the LPA, the Environment Agency and the applicant through discussions to consider ways in which the application might have been amended, or additional information provided, which would have allowed the Environment Agency's objection to be withdrawn.

29. LPAs should notify the Environment Agency of the outcome of all planning applications for development in flood risk areas, including those for major development. Other organisations which have been consulted, such as Internal Drainage Boards (IDBs), should be notified where conditions attached to planning permissions may affect their area of concern, such as local drainage.

The Environment Agency

30. The Environment Agency has statutory responsibility for flood management and defence in England and will support the planning system by providing timely information and advice on flooding issues that is fit for purpose. At a strategic level, it provides RPBs and LPAs with advice on the preparation of RFRA and SFRA. It is a statutory consultation body for RSSs and LDDs, for strategic environmental assessment and sustainability appraisal, for planning applications as defined in the GDPO and for environmental impact assessment. It also provides advice to those proposing developments and undertaking FRAs.
31. The Environment Agency will be consulted by local planning authorities on all applications for development in flood risk areas and should contribute to their consideration by providing advice, as set out in para. 26. A small number of the applications that the Environment Agency will be consulted on will be for major development. The procedure for dealing with these particular types of application, where the Environment Agency lodges an objection, is set out in paras. 27 and 28.

Other Bodies

32. Details of the roles of other main stakeholder bodies are given in Annex H.

Working in Constructive Partnership

33. There should be early consideration of flood risk in the formulation of Regional Spatial Strategies, Local Development Documents and proposals for development by regional planning bodies, local planning authorities, the Environment Agency, other stakeholders (see Annex H) and developers. This should identify opportunities for development of infrastructure that offers wider sustainability benefits. These include dual use ie flood storage and recreation and realising cost effective solutions for the reduction and management of flood risk. Consultation should also identify flood risk problems that will need to be addressed.

34. Proposers of development which may be affected by, or may add to flood risk should arrange pre-application discussions with the LPA and the Environment Agency, and, where relevant, other bodies such as Internal Drainage Boards, sewerage undertakers, highways authorities and reservoir owners and operators. Such discussions should identify the likelihood and possible extent and nature of the flood risk, to assist in scoping the FRA and identify the information that will be required by the LPA to reach a decision on the application when it is submitted. LPAs should advise intending developers to undertake these steps where they appear necessary, but have not yet been addressed.

Monitoring and Review

35. Effective monitoring and review is essential to reducing and managing flood risk. The Environment Agency and local planning authorities have a key role in the provision of relevant information. The principal national source of information is the annual monitoring of the impact of the technical advice on flood risk provided by the Environment Agency on planning decisions made by LPAs. This is given annually in the Environment Agency's High Level Target 5 (HLT5) report produced jointly with local government for the Department for Environment, Food and Rural Affairs (Defra) and the Department for Communities and Local Government.
36. Key indicators from the HLT5 report are:
 - the number of planning applications permitted by LPAs, where the outcome is known, against a sustained objection from the Environment Agency on flood risk grounds, as a percentage of the total number of applications to which the Environment Agency sustained an objection on flood risk grounds;
 - the number of planning applications for major development permitted by LPAs, where the outcome is known, against a sustained objection from the Environment Agency on flood risk grounds, as a percentage of the total number of planning applications permitted against sustained Environment Agency advice on flood risk;
 - the lack of a FRA or an inadequate FRA cited as the reason for an Environment Agency objection to planning applications, as a percentage of the total number of its objections on flood risk grounds; and
 - the number of decision notices received from LPAs by the Environment Agency as a percentage of the number of objections the Environment Agency made to planning applications on flood risk grounds.
37. LPAs should request FRAs in accordance with Annex E. They should work closely with the Environment Agency on resolving objections to development proposals. If the current HLTs are changed or replaced by alternative measures during the lifetime of this guidance, LPAs are encouraged to contribute positively to providing information to assist the effective monitoring of flood risk.

Annex A: The Government's Aims for Sustainable Development

- A1. The Government set out five principles for sustainable development in its 2005 strategy for sustainable development *Securing the Future – UK Government Sustainable Development Strategy*.¹⁰
- **Living Within Environmental Limits** – Respecting the limits of the planet's environment, resources and biodiversity – to improve our environment and ensure that the natural resources needed for life are unimpaired and remain so for future generations;
 - **Ensuring a Strong, Healthy and Just Society** – Meeting the diverse needs of all people in existing and future communities, promoting personal wellbeing, social cohesion and inclusion, and creating equal opportunity for all;
 - **Achieving a Sustainable Economy** – Building a strong, stable and sustainable economy which provides prosperity and opportunities for all, and in which environmental and social costs fall on those who impose them (polluter pays), and efficient resource use is incentivised;
 - **Promoting Good Governance** – Actively promoting effective, participative systems of governance in all levels of society– engaging people's creativity, energy, and diversity; and
 - **Using Sound Science Responsibly** – Ensuring policy is developed and implemented on the basis of strong scientific evidence, whilst taking into account scientific uncertainty (through the precautionary principle) as well as public attitudes and values.
- A2. The shared priorities for action contained in *Securing the Future* include preparing for the climate change that cannot now be avoided and creating sustainable communities that embody the principles of sustainable development at the local level.
- A3. Planning Policy Statement 1 (PPS1): *Delivering Sustainable Development*¹¹ sets out the overarching planning policies on the delivery of sustainable development through the planning system. It sets out how regional planning bodies and local planning authorities are expected to prepare development plan policies which avoid new development in areas at risk of flooding and sea level rise, and take climate change impacts into account in the location and design of the development. The Planning Policy Statement *Planning and Climate Change*¹², provides expanded policy on planning's contribution to mitigating and adapting to climate change.

¹⁰ Defra, 2005. *Securing the Future – UK Government Sustainable Development Strategy* www.sustainable-development.gov.uk/publications/uk-strategy/index.htm

¹¹ ODPM, 2005. Planning Policy Statement 1 (PPS1): *Delivering Sustainable Development* www.communities.gov.uk/index.asp?id=1143804

¹² Planning Policy Statement: *Planning and Climate Change*, consultation December 2006

Annex B: Climate Change

- B1. There is an increasing body of scientific evidence that the global climate is changing as a result of human activity. Past, present and future emissions of greenhouse gases are expected to cause significant global climate change during this century. The nature of climate change at a regional level will vary: for the UK, projections of future climate change indicate that more frequent short-duration, high-intensity rainfall and more frequent periods of long-duration rainfall of the type responsible for the 2000 floods could be expected. Sea levels will continue to rise. These kinds of changes will have implications for river flooding and also for local flash flooding. There are several indications that the climate in the UK is already changing. Central England's temperature rose by almost 1°C during the twentieth century. Heat waves have become more frequent in summer and there are now fewer frosts and winter cold spells. Winters over the last 200 years have become wetter relative to summers; a larger proportion of winter precipitation in all regions now falls on heavy rainfall days than was the case 50 years ago.
- B2. To help organisations (including local authorities and regional planning bodies) to assess their vulnerability to climate change and plan appropriate adaptation strategies, the Government established the UK Climate Impacts Programme (UKCIP).¹³ Scenarios of future climate change in the UK¹⁴ were produced for the UKCIP in 2002 and published by the Department for Environment, Food and Rural Affairs (Defra). Over the next 2-3 years, this climate change scenario information will be revised, expanded and developed to better meet stakeholder needs.
- B3. The companion guide supporting the PPS *Planning and Climate Change*¹⁵ will provide guidance on how planning should secure new development and shape places resilient to the effects of climate change.
- B4. The Foresight project on future flood risk reported in April 2004.¹⁶ The project found that, using the UKCIP02 climate change projections, together with scenarios of potential economic and social changes, annual damage from flooding may rise from around £100 million to between £460 million (under the community orientated *Local Stewardship scenario*) and £2,500 million (under the more consumerist *World Markets scenario*) by 2080.
- B5. Global sea level will continue to rise, depending on greenhouse gas emissions and the sensitivity of the climate system. The relative sea level rise in England also depends on the local vertical movement of the land, which is generally falling in the south-east and rising in the north and west. Allowances for the regional rates of relative sea level rise shown in Table B.1 should be used as a starting point for considering flooding from the sea, along with the sensitivity ranges for wave height and wind speed in Table B.2, in preparing flood risk assessments.

¹³ www.ukcip.org.uk

¹⁴ Defra, 2002. *Scenarios of future climate change in the UK*
http://www.ukcip.org.uk/scenarios/ukcip02/documentation/ukcip02_scientific_report.asp

¹⁵ see footnote 1

¹⁶ DTI, 2004. *The Foresight Future Flooding project*
www.foresight.gov.uk/Previous_Projects/Flood_and_Coastal_Defence/Reports_and_Publications/Project_Outputs/Outputs.htm

Table B.1 Recommended contingency allowances for net sea level rise

Administrative Region	Net Sea Level Rise (mm/yr) Relative to 1990			
	1990 to 2025	2025 to 2055	2055 to 2085	2085 to 2115
East of England, East Midlands, London, SE England (south of Flamborough Head)	4.0	8.5	12.0	15.0
South West	3.5	8.0	11.5	14.5
NW England, NE England (north of Flamborough Head)	2.5	7.0	10.0	13.0

Notes:

1. For deriving sea levels up to 2025, the 4mm/yr, 3mm/yr and 2.5mm/yr rates (covering the three groups of administrative Regions respectively), should be applied back to the 1990 base sea level year. From 2026 to 2055, the increase in sea level in this period is derived by adding the number of years on from 2025 (to 2055), multiplied by the respective rate shown in the table. Subsequent time periods 2056-2085 and 2086-2115 are treated similarly.
 2. Refer to Defra FCDPAG3 *Economic Appraisal Supplementary Note to Operating Authorities – Climate Change Impacts*, October 2006, for details of the derivation of this table. In particular, Annex A1 of this Note shows examples of how to calculate sea level rise.
 3. Vertical movement of the land is incorporated in the table and does not need to be calculated separately.
- B6. The rise in sea level will change the frequency of occurrence of high water levels relative to today's sea levels, assuming no change in storminess. There may also be secondary impacts such as changes in wave heights due to increased water depths, as well as possible changes in the frequency, duration and severity of storm events. A 10 per cent sensitivity allowance should be added to offshore wind speeds and wave heights by the 2080s.
- B7. Extensive, low-lying coastal lands around most British estuaries are particularly susceptible to flooding. Changes to the drivers associated with coastal erosion (surges, waves, coastal sediment supply and morphology, and relative sea level rise) will affect the probability of flooding to new developments.
- B8. The climate changes already seen in the UK are consistent with the UKCIP02 scenarios. This suggests that winters will become wetter over the whole of the UK, by as much as 20 per cent by the 2050s. A shift in the seasonal pattern of rainfall is also expected, with summers and autumn becoming much drier than at present. Snowfall amounts will

decrease significantly throughout the UK, but the number of rain-days and the average intensity of rainfall are expected to increase. Although average seasonal wind speeds could increase over most of the country, there is currently much less certainty regarding the potential for greater storminess and the consequences for sea surges or extreme wave activity on coasts.

- B9. In making an assessment of the impacts of climate change on flooding from the land, rivers and sea as part of a flood risk assessment, the sensitivity ranges in Table B.2 may provide an appropriate precautionary response to the uncertainty about climate change impacts on rainfall intensities, river flow, wave height and wind speed.

Table B.2 Recommended national precautionary sensitivity ranges for peak rainfall intensities, peak river flows, offshore wind speeds and wave heights.

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%	

Notes:

1. Refer to *Defra FCDPAG3 Economic Appraisal Supplementary Note to Operating Authorities – Climate Change Impacts, October 2006*, for details of the derivation of this table.
 2. For deriving peak rainfall, for example, between 2025-2055 multiply the rainfall measurement (in mm/hour) by 10 per cent and between 2055-2085 multiply the rainfall measurement by 20 per cent. So, if there is a 10mm/hour event, for the 2025-2055 period this would equate to 11mm/hour; and for the 2055/2085 period, this would equate to 12mm/hour. Other parameters in Table B.2 are treated similarly.
- B10. Sensitivity testing of the Flood Map produced by the Environment Agency, using the 20 per cent from 2025 to 2115 allowance for peak flows, suggests that changes in the extent of inundation are negligible in well-defined floodplains, but can be dramatic in very flat areas. However, changes in the depth of flooding under the same allowance will reduce the return period of a given flood. This means that a site currently located within a lower risk zone (eg Zone 2 in Table D.1, Annex D) could in future be re-classified as lying within a higher risk zone (eg Zone 3). This in turn could have implications for the type of development that is appropriate according to its vulnerability to flooding (see Table D.2, Annex D). It will therefore be important that developers, their advisors and local authorities refer to the current Flood Map and the SFRA when preparing and considering proposals.

- B11. Flooding in estuaries may result from the combined effects of high river flows and high sea surges. When taking account of impacts of climate change in flood risk assessments covering tidal estuaries, it will be necessary for the allowances for sea level rise in Table B.1 (see para. B5) and the allowances for peak flow, wave height and wind speed in Table B.2 (see para. B9) should be combined.¹⁷
- B12. Indirect impacts of climate change on land use and land management may change future flood risk. For example, changes in crop type, methods of cultivation and harvesting could affect the porosity and surface of the ground and hence the volume, speed and direction of storm run-off.
- B13. Adaptation to climate change requires an integrated approach across different sectors including land use, water resources, transport, biodiversity and recreation. This integrated approach should be reflected in flood risk assessment.
- B14. Knowledge and understanding of climate change is continuing to grow. The next UKCIP scenarios, due in 2008, are expected to provide more detail on regional climate changes and to express this information in probabilistic terms. Other areas where further research is in progress include climate-driven risks from groundwater and sewer flooding. The most up-to-date guidance on climate change and flooding from the Environment Agency, Defra, Communities and Local Government and the UKCIP should be considered in the preparation of Regional Flood Risk Appraisals, Strategic Flood Risk Assessments and site specific Flood Risk Assessments.

¹⁷ Refer to Defra *FCDPAG3 Economic Appraisal Supplementary Note to Operating Authorities – Climate Change Impacts*, October 2006. Annex A2 gives details of joint probability analysis.
www.defra.gov.uk/environ/fcd/pubs/pagn/climatechangeupdate.pdf

Annex C: Forms of Flooding

- C1. Flooding is a natural process and can happen at any time in a wide variety of locations. A number of forms of flooding present a range of different risks. The speed of inundation and the duration varies greatly. With climate change, the frequency, patterns and severity of flooding are forecast to change and become more damaging.
- C2. The limits of flood risk areas cannot be defined precisely because floods with similar probability can arise from different combinations of weather, sources, rainfall patterns, local topography and patterns of development.
- C3. Flooding can come from rivers and the sea, directly from rainfall on the ground surface and from rising groundwater, overwhelmed sewers and drainage systems. Every flood will have a different impact on people, property and the environment. The consequences of flooding depend greatly on land use. Overtopping and/or breach of a flood defence in a densely populated urban area poses a serious threat to human life. The same event in a less populated rural area may pose a lower risk. Run-off may be polluted with hydrocarbons and other vehicle residues from road surfaces and a potentially wide range of other chemicals from hard surfaces on industrial or agricultural sites.

Flooding from Rivers

- C4. Rivers flood when the amount of water in them exceeds the flow capacity of the river channel. Most rivers have a natural floodplain into which the water spills in times of flood. Flooding can either develop gradually or rapidly according to how steeply the ground rises in the catchment and how fast water runs off into surface watercourses. In a large, relatively flat catchment, flood levels will rise slowly and natural floodplains may remain flooded for several days, acting as the natural regulator of the flow. This is a function that the planning system should promote and enhance. In small, steep catchments, local intense rainfall can result in the rapid onset of deep and fast-flowing flooding with little warning. Such “flash” flooding, which may only last a few hours, can cause considerable damage and possible threat to life. Land use, topography and the form of local development can have a strong influence on the velocity and volume of water and its direction of flow at particular points. Flooding can occur when culverts and bridges are blocked by debris.

Flooding from the Sea

- C5. Flooding to low-lying land from the sea and tidal estuaries is caused by storm surges and high tides. Where tidal defences exist, they can be overtopped or breached during a severe storm, which may be more likely with climate change. The onset of flooding from the sea can be extremely rapid. Deep, fast-flowing water can create an extreme hazard. The severity of such flooding will depend on a number of factors, often in combination: the height of tides; weather systems; wind and wave conditions; topography; the effectiveness of drainage systems; and the condition of flood defences. The consequences and impacts of flooding

from the sea and tidal waters are more severe than flooding from rivers. It is for this reason that Flood Zone 3a (see Table D.1, Annex D) has a 0.5 per cent annual probability boundary for flooding from the sea and tidal waters while from rivers it has a 1.0 per cent annual probability boundary.

Flooding from Land

- C6. Intense rainfall, often of short duration, that is unable to soak into the ground or enter drainage systems can run quickly off land and result in local flooding. In developed areas, this flood water can be polluted with domestic sewage where foul sewers surcharge and overflow. Local topography and built form can have a strong influence on the direction and depth of flow. The design of development down to a micro-level can influence or exacerbate this. Overland flow paths should be taken into account in spatial planning for urban developments. Flooding can be exacerbated if development increases the percentage of impervious area.

Flooding from Groundwater

- C7. Groundwater flooding occurs when water levels in the ground rise above surface elevations. It is most likely to occur in low-lying areas underlain by permeable rocks (aquifers). These may be extensive, regional aquifers, such as Chalk or sandstone, or may be localised sands or river gravels in valley bottoms underlain by less permeable rocks. Water levels below the ground rise during wet winter months, and fall again in the summer as water flows out into rivers. In very wet winters, rising water levels may lead to the flooding of normally dry land, as well as reactivating flow in 'bournes' – intermittent streams that only flow for part of the time, when groundwater levels are high. The Chalk shows some of the largest seasonal variations in groundwater level, and is the most extensive source of groundwater flooding. Groundwater flooding may take weeks or months to dissipate because groundwater flow is much slower than surface flow and water levels thus take much longer to fall.

Flooding from Sewers

- C8. In urban areas, rainwater is frequently drained into surface water sewers or sewers containing both surface and waste water known as "combined sewers". Flooding can result when the sewer is overwhelmed by heavy rainfall, becomes blocked or is of inadequate capacity, and will continue until the water drains away. When this happens to combined sewers, there is a high risk of land and property flooding with water contaminated with raw sewage as well as pollution of rivers due to discharge from combined sewer overflows.

Flooding from Reservoirs, Canals and Other Artificial Sources

- C9. Non-natural or artificial sources of flooding can include reservoirs, canals and lakes where water is retained above natural ground level, operational and redundant industrial processes including mining, quarrying and sand and gravel extraction, as they may increase floodwater depths and velocities in adjacent areas. The potential effects of flood risk management infrastructure and other structures also need to be considered. Reservoir or canal flooding may occur as a result of the facility being overwhelmed and/or as a result of dam or bank failure. The latter can happen suddenly resulting in rapidly flowing, deep water that can cause significant threat to life and major property damage. Industrial flooding can also occur when pumping ceases and groundwater returns to its natural level, for example in former mineral workings and urban areas where industrial water abstraction is reduced from its former rate. Some of this flooding may be contaminated.

Annex D: The Sequential Test and Exception Test

The Sequential Test

- D1. The risk-based Sequential Test should be applied at all stages of planning. Its aim is to steer new development to areas at the lowest probability of flooding (Zone 1).
- D2. The Flood Zones are the starting point for the sequential approach. Zones 2 and 3 are shown on the Environment Agency Flood Map¹⁸ with Flood Zone 1 being all the land falling outside Zones 2 and 3. These Flood Zones refer to the probability of sea and river flooding only, ignoring the presence of existing defences.
- D3. Regional Flood Risk Appraisals (RFRAs) (see Annex E) will refer to Environment Agency Flood Maps and will utilise further information such as Strategic Flood Risk Assessments to allow flood risk to be taken into account in a broad regional context (see Annex E para. E4).
- D4. Strategic Flood Risk Assessments (SFRAs) (see Annex E) will refine information on the probability of flooding, taking other sources of flooding (see Annex C) and the impacts of climate change into account. The SFRA will provide the basis for applying the Sequential Test, on the basis of the Zones in Table D.1. Where Table D.1 indicates the need to apply the Exception Test, the scope of the SFRA will be widened to consider the impact of the flood risk management infrastructure on the frequency, impact, speed of onset, depth and velocity of flooding within the Flood Zones considering a range of flood risk management maintenance scenarios. Where a SFRA is not available, the Sequential Test will be based on the Environment Agency Flood Zones.
- D5. The overall aim of decision-makers should be to steer new development to Flood Zone 1. Where there are no reasonably available sites in Flood Zone 1, decision-makers identifying broad locations for development and infrastructure, allocating land in spatial plans or determining applications for development at any particular location should take into account the flood risk vulnerability of land uses and consider reasonably available sites in Flood Zone 2, applying the Exception Test if required. Only where there are no reasonably available sites in Flood Zones 1 or 2 should decision-makers consider the suitability of sites in Flood Zone 3, taking into account the flood risk vulnerability of land uses and applying the Exception Test if required.
- D6. Within each Flood Zone, new development should be directed first to sites at the lowest probability of flooding and the flood vulnerability of the intended use matched to the flood risk of the site, eg higher vulnerability uses located on parts of the site at lowest probability of flooding.

¹⁸ See website for further details on Flood Map. www.environment-agency.gov.uk/maps/info/floodmaps/?lang=_e

- D7. The preparation and review of Regional Spatial Strategies (RSSs) and Local Development Documents (LDDs) should be used to review existing and proposed development in order to allocate land in lower flood risk zones suitable for existing vulnerable uses already in medium and high flood zones, and in doing so, to realise opportunities arising through redevelopment to improve the sustainability of communities.
- D8. When seeking planning permission for individual developments on sites allocated in development plans through the application of the Sequential Test, informed by a SFRA, developers need not apply the Sequential Test, but should apply the sequential approach (see para. 14) to locating development within the site. The plan should specify requirements for Flood Risk Assessment (see Annex E).

Table D.1: Flood Zones

(Note: These Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences)

Zone 1 Low Probability

Definition

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%).

Appropriate uses

All uses of land are appropriate in this zone.

FRA requirements

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

Policy aims

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

Table D.1: contd.

Zone 2 Medium Probability

Definition

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

Appropriate uses

The water-compatible, less vulnerable and more vulnerable uses of land and essential infrastructure in Table D.2 are appropriate in this zone.

Subject to the Sequential Test being applied, the highly vulnerable uses in Table D.2 are only appropriate in this zone if the Exception Test (see para. D.9.) is passed.

FRA requirements

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

Policy aims

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

Zone 3a High Probability

Definition

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.

Appropriate uses

The water-compatible and less vulnerable uses of land in Table D.2 are appropriate in this zone.

The highly vulnerable uses in Table D.2 should not be permitted in this zone.

The more vulnerable and essential infrastructure uses in Table D.2 should only be permitted in this zone if the Exception Test (see para. D.9) is passed. Essential infrastructure permitted in this zone should be designed and constructed to remain operational and safe for users in times of flood.

FRA requirements

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

Table D.1: contd.

Zone 3a High Probability (*continued*)

Policy aims

In this zone, developers and local authorities should seek opportunities to:

- i. reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage techniques;
- ii. relocate existing development to land in zones with a lower probability of flooding; and
- iii. create space for flooding to occur by restoring functional floodplain and flood flow pathways and by identifying, allocating and safeguarding open space for flood storage.

Zone 3b The Functional Floodplain

Definition

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

Appropriate uses

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

- remain operational and safe for users in times of flood;
- result in no net loss of floodplain storage;
- not impede water flows; and
- not increase flood risk elsewhere.

Essential infrastructure in this zone should pass the Exception Test.

FRA requirements

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

Policy aims

In this zone, developers and local authorities should seek opportunities to:

- i. reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage techniques; and
- ii. relocate existing development to land with a lower probability of flooding.

Table D.2: Flood Risk Vulnerability Classification

Essential Infrastructure	<ul style="list-style-type: none"> • Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk, and strategic utility infrastructure, including electricity generating power stations and grid and primary substations.
Highly Vulnerable	<ul style="list-style-type: none"> • Police stations, Ambulance stations and Fire stations and Command Centres and telecommunications installations required to be operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use. • Installations requiring hazardous substances consent.¹⁹
More Vulnerable	<ul style="list-style-type: none"> • Hospitals. • Residential institutions such as residential care homes, children’s homes, social services homes, prisons and hostels. • Buildings used for: dwelling houses; student halls of residence; drinking establishments; nightclubs; and hotels. • Non–residential uses for health services, nurseries and educational establishments. • Landfill and sites used for waste management facilities for hazardous waste.²⁰ • Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.
Less Vulnerable	<ul style="list-style-type: none"> • Buildings used for: shops; financial, professional and other services; restaurants and cafes; hot food takeaways; offices; general industry; storage and distribution; non–residential institutions not included in ‘more vulnerable’; and assembly and leisure. • Land and buildings used for agriculture and forestry. • Waste treatment (except landfill and hazardous waste facilities). • Minerals working and processing (except for sand and gravel working). • Water treatment plants. • Sewage treatment plants (if adequate pollution control measures are in place).

¹⁹ DETR Circular 04/00 – para. 18: *Planning controls for hazardous substances*. www.communities.gov.uk/index.asp?id=1144377

²⁰ See *Planning for Sustainable Waste Management: Companion Guide to Planning Policy Statement 10* for definition. www.communities.gov.uk/index.asp?id=1500757

Table D.2: contd.

Water-compatible Development	<ul style="list-style-type: none"> • Flood control infrastructure. • Water transmission infrastructure and pumping stations. • Sewage transmission infrastructure and pumping stations. • Sand and gravel workings. • Docks, marinas and wharves. • Navigation facilities. • MOD defence installations. • Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. • Water-based recreation (excluding sleeping accommodation). • Lifeguard and coastguard stations. • Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms. • Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.
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Notes:

- 1) This classification is based partly on Defra/Environment Agency research on Flood Risks to People (FD2321/TR2)²¹ and also on the need of some uses to keep functioning during flooding.
- 2) Buildings that combine a mixture of uses should be placed into the higher of the relevant classes of flood risk sensitivity. Developments that allow uses to be distributed over the site may fall within several classes of flood risk sensitivity.
- 3) The impact of a flood on the particular uses identified within this flood risk vulnerability classification will vary within each vulnerability class. Therefore, the flood risk management infrastructure and other risk mitigation measures needed to ensure the development is safe may differ between uses within a particular vulnerability classification.

²¹ See website for further details. www.defra.gov.uk/science/Project_Data/DocumentLibrary/FD2320_3364_TRP.pdf

Table D.3²²: Flood Risk Vulnerability and Flood Zone ‘Compatibility’

Flood Risk Vulnerability classification (see Table D2)		Essential Infrastructure	Water compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone (see Table D.1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	✗	Exception Test required	✓
	Zone 3b ‘Functional Floodplain’	Exception Test required	✓	✗	✗	✗

Key:

- ✓ Development is appropriate
- ✗ Development should not be permitted

The Exception Test

D9. 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 DPD has reached the ‘submission’ stage – see Figure 4 of PPS12: *Local Development Frameworks* – the benefits of the development should contribute to the Core Strategy’s Sustainability Appraisal;
- b) the development should be on developable²³ previously-developed land or, if it is not on previously developed land²⁴, that there are no reasonable alternative sites on developable previously-developed land; and
- c) a FRA must demonstrate that the development will be safe, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

²² This table does not show: the application of the Sequential Test which guides development to FZ1 first, then FZ2, and then FZ3; FRA requirements; or the policy aims for each Flood Zone.

²³ Developable sites are defined in Planning Policy Statement 3 (PPS3) *Housing* as those sites which should be in a suitable location for housing development and there should be a reasonable prospect that the site is available for, and could be developed at the point envisaged.

²⁴ Previously-developed land definition (commonly known as Brownfield Land). See Annex B of Planning Policy Statement 3 *Housing*.

- D10. The Exception Test should be applied by decision-makers only after the Sequential Test has been applied and in the circumstances shown in Table D.1 when ‘more vulnerable’ development and ‘essential infrastructure’ cannot be located in Zones 1 or 2 and ‘highly vulnerable’ development cannot be located in Zone 1. It should not be used to justify ‘highly vulnerable’ development in Flood Zone 3a, or ‘less vulnerable’; ‘more vulnerable’; and ‘highly vulnerable’ development in Flood Zone 3b.
- D11. The Exception Test should be applied to LDD site allocations for development and used to draft criteria-based policies against which to consider planning applications. Where application of the Sequential Test indicates it needs to be applied, this should be done as early in the plan-making process as possible – in LDDs, including Supplementary Planning Documents (such as site development briefs). This will minimise the need to apply it to individual planning applications.
- D12. Where the Exception Test has been applied in LDD allocations or criteria-based policies, the local planning authority should include policies in its LDDs to ensure that the developer’s FRA satisfies criterion c) in para. D9. The Environment Agency and other appropriate operating authorities such as Internal Drainage Boards should be consulted on the drafting of any policy intended to apply the Exception Test at a local level.
- D13. Compliance with each part of the Exception Test should be demonstrated in an open and transparent way.
- D14. Criterion b) of para. D9 reflects the Government’s commitment to making the most efficient and effective use of land in line with the principles of sustainable development. Reflecting this, Planning Policy Statement 3 (PPS3): *Housing*²⁵ sets out the Government’s objectives for a flexible, responsive supply of land for housing which gives priority to the use of previously-developed land for development. However, flood risk should be taken into account in determining the suitability of the land for development.

Minor Development and Changes of Use

- D15. Applications for minor development²⁶ and changes of use should not be subject to the Sequential or Exception Tests but will still have to meet the requirements for FRAs and flood risk reduction set out in Table D.1.
- D16. Minor developments are unlikely to raise significant flood risk issues unless they would:
- a) have an adverse effect on a watercourse, floodplain or its flood defences;
 - b) would impede access to flood defence and management facilities; or
 - c) where the cumulative impact of such developments would have a significant effect on local flood storage capacity or flood flows.

²⁵ Communities and Local Government 2006 *Planning Policy Statement 3 (PPS3): Housing* www.communities.gov.uk/index.asp?id=1504592

²⁶ For definitions of minor development see footnote 7

- D17. Developers should refer to Environment Agency's Standing Advice²⁷ for requirements regarding a FRA before designing their development and such extensions or alterations should be designed and constructed to conform to any flood protection already incorporated in the property being extended and should include flood resilience measures in the design.

Removal of Permitted Development Rights

- D18. Where permitted development (that is, development granted a general planning permission by the Secretary of State) threatens to have a direct, significant and adverse effect on a flood risk area, or its flood defences and their access, or the permeability and management of surface water, or flood risk to occupants, the local planning authority should consider whether to make a direction under article 4 of the Town and Country Planning (General Permitted Development) Order 1995 (S.I. 1995/418). An article 4 direction would require a planning application to be made for specific permission to carry out the development. This would enable the local planning authority to assess the possible impacts of the works or change of land-use, and decide whether to grant permission, if necessary subject to conditions, or refuse it.

Caravans and Camping; Chalets and Mobile Homes (including Gypsy and Traveller Sites)

- D19. Land used for holiday or short-let caravans and camping, other temporary occupancy sites and permanently occupied caravan, mobile home and 'park home' sites that use similar structures give rise to special problems in relation to flooding. Caravan or park-home sites intended for permanent occupation are regarded as 'highly vulnerable'. The instability of such structures places their occupants at special risk and they are likely to be occupied during periods when flood risk is likely to be higher.
- D20. Sites intended for temporary occupation are classified as 'more vulnerable' because they are usually occupied at times of the year when flood events are less likely to occur, although they may be located for amenity and recreational reasons on coastal or riverside sites with a high residual risk of flooding. However, the attractiveness of waterside sites for holiday accommodation also has to be recognised, provided that proper warning and evacuation arrangements are put in place through appropriate planning conditions.
- D21. In either case, the Sequential Test and Exception Test should be used by decision-makers (where applicable, – remembering that 'highly vulnerable' development should not be permitted in Zones 3a and 3b and 'more vulnerable' development should not be permitted in Zone 3b). FRAs should pay particular attention to the management of residual risk, flood warning arrangements and evacuation plans should be considered (see Annex G).

²⁷ The Environment Agency's Flood Risk Standing Advice (www.environment-agency.gov.uk) enables local planning authorities to clearly identify which applications they should consult the Environment Agency on and make decisions on low risk planning applications where, for example, flood risk is an issue, without directly consulting the Environment Agency for an individual response.

Annex E: The Assessment of Flood Risk

General Principles

- E1. Properly prepared assessments of flood risk will inform the decision-making process at all stages of development planning. There should be iteration between the different levels of flood risk assessment.
- E2. Any organisation or person proposing a development must consider whether that development will not add to and should where practicable reduce flood risk. The future users of the development must not be placed in danger from flood hazards and should remain safe throughout the lifetime of the plan or proposed development and land use.
- E3. At all stages of the planning process, the minimum requirements for flood risk assessments are that they should:
 - be proportionate to the risk and appropriate to the scale, nature and location of the development;
 - consider the risk of flooding arising from the development in addition to the risk of flooding to the development;
 - take the impacts of climate change into account (see Annex B);
 - be undertaken by competent people, as early as possible in the particular planning process, to avoid misplaced effort and raising landowner expectations where land is unsuitable for development;
 - consider both the potential adverse and beneficial effects of flood risk management infrastructure including raised defences, flow channels, flood storage areas and other artificial features together with the consequences of their failure;
 - consider the vulnerability of those that could occupy and use the development, taking account of the Sequential and Exception Tests and the vulnerability classification (see Annex D), including arrangements for safe access;
 - consider and quantify the different types of flooding (whether from natural and human sources and including joint and cumulative effects) and identify flood risk reduction measures, so that assessments are fit for the purpose of the decisions being made;
 - consider the effects of a range of flooding events including extreme events on people, property, the natural and historic environment and river and coastal processes;
 - include the assessment of the remaining (known as 'residual') risk (see Annex G) after risk reduction measures have been taken into account and demonstrate that this is acceptable for the particular development or land use;
 - consider how the ability of water to soak into the ground may change with development, along with how the proposed layout of development may affect drainage systems; and
 - be supported by appropriate data and information, including historical information on previous events.

Regional Flood Risk Appraisals (RFRAs)

- E4. Regional Planning Bodies should prepare RFRAs in consultation with the Environment Agency to inform their Regional Spatial Strategies (RSSs) on flood risk issues. By undertaking a strategic analysis of flood risk, RFRAs should inform RSS consideration of regionally significant uses, including the identification of broad locations and establishing locational criteria to highlight flooding issues that local planning authorities should address through their SFRAs. RFRAs should be informed by the Flood Map and appropriate plans prepared by the Environment Agency and other operating authorities (such as River Basin Management Plans, Catchment Flood Management Plans and Shoreline Management Plans). A RFRA should be used to inform the Sustainability Appraisal (incorporating the SEA Directive) of the RSS.

Strategic Flood Risk Assessments (SFRAs)

- E5. Local planning authorities (LPAs) and other decision-makers should prepare SFRAs in consultation with the Environment Agency, LPAs own functions of emergency response and drainage authority under the Land Drainage Act 1991, and where appropriate Internal Drainage Boards. Initially the SFRA will be used to refine information on the areas that may flood, taking into account other sources of flooding (see Annex C) and the impacts of climate change, in addition to the information on the Flood Map. Decision-makers should use the SFRA to inform their knowledge of flooding, refine the information on the Flood Map and determine the variations in flood risk from all sources of flooding across and from their area. These should form the basis for preparing appropriate policies for flood risk management for these areas. The SFRA should be used to inform the Sustainability Appraisal (incorporating the SEA Directive) of the Local Development Documents (LDDs), and will provide the basis from which to apply the Sequential Test and Exception Test in the development allocation and development control process (see Annex D).
- E6. Where decision-makers have been unable to allocate all proposed development and infrastructure in accordance with the Sequential Test, taking account of the flood vulnerability category of the intended use, it will be necessary to increase the scope of the SFRA to provide the information necessary for application of the Exception Test. This should additionally, consider the beneficial effects of flood risk management infrastructure in generally reducing the extent and severity of flooding when compared to the Flood Zones on the Flood Map. The increased scope of the SFRA will enable the production of mapping showing flood outlines for different probabilities, impact, speed of onset, depth and velocity variance of flooding taking account of the presence and likely performance of flood risk management infrastructure.

- E7. There may be considerable benefits in several LPAs, within a catchment area of high development pressure or a designated development area, joining together to undertake a sub-regional Strategic Flood Risk Assessment. This will help LPAs to consider the issues raised by flooding on the wider scale (of the river catchment and/or coastal cell). This will enable them to contribute to, and take account of, the River Basin Management Plans required to be published by 2009 by the Environment Agency as part of the implementation of the EC Water Framework Directive.

Site-specific Flood Risk Assessments (FRAs)

- E8. At the planning application stage, an appropriate FRA will be required to demonstrate how flood risk from all sources of flooding to the development itself and flood risk to others will be managed now and taking climate change into account. Policies in LDDs should require FRAs to be submitted with planning applications in areas of flood risk identified in the plan.
- E9. Planning applications for development proposals of 1 hectare or greater in Flood Zone 1 and all proposals for new development located in Flood Zones 2 and 3 (see Table D.1, Annex D) should be accompanied by a FRA. This should identify and assess the risks of all forms of flooding to and from the development and demonstrate how these flood risks will be managed, taking climate change into account. For major developments in Flood Zone 1, the FRA should identify opportunities to reduce the probability and consequences of flooding. A FRA will also be required where the proposed development or change of use to a more vulnerable class may be subject to other sources of flooding (see Annex C) or where the Environment Agency, Internal Drainage Board and/or other bodies have indicated that there may be drainage problems.
- E10. The FRA should be prepared by the developer in consultation with the LPA. The FRA should form part of an Environmental Statement when one is required by the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 as amended.

Annex F: Managing Surface Water

- F1. Flooding results both from sources external to the development site and rain falling onto and around the site. The sustainable management of this rainfall, described as surface water, is an essential element of reducing future flood risk to both the site and its surroundings. Assessment of surface water and drainage will be required as part of a FRA.

Drainage Systems

- F2. Undeveloped sites generally rely on natural drainage to convey or absorb rainfall, the water either soaking into the ground or flowing across the surface into watercourses, providing a natural flow of environmental and ecological benefit. Sites currently or previously used for agricultural purposes may additionally have systems of underground drainage pipes as well as open ditches and watercourses.

The Effect of Development

- F3. The effect of development is generally to reduce the permeability of at least part of the site. This markedly changes the site's response to rainfall. Without specific measures, the volume of water that runs off the site and the peak run-off flow rate is likely to increase. Inadequate surface water drainage arrangements in new development can threaten the development itself and increase the risk of flooding to others.
- F4. To satisfactorily manage flood risk in new development, appropriate surface water drainage arrangements are required, to manage surface water and the impact of the natural water cycle on people and property.
- F5. The effective disposal of surface water from development is a material planning consideration in determining proposals for the development and use of land. It will always be much more effective to manage surface water flooding at and from new development early in the land acquisition and design process rather than to resolve problems after development. Site layout should be influenced by the topography. The location of buildings where surface water may flow naturally, or as a result of development, under extreme circumstances should be avoided if possible.
- F6. Surface water arising from a developed site should, as far as is practicable, be managed in a sustainable manner to mimic the surface water flows arising from the site prior to the proposed development, while reducing the flood risk to the site itself and elsewhere, taking climate change into account. This should be demonstrated as part of the flood risk assessment.

Surface Water Drainage and Sustainable Drainage Systems (SUDS)

- F7. The term Sustainable Drainage Systems (SUDS) is frequently used and taken in this PPS to cover the whole range of sustainable approaches to surface water drainage management including:
- source control measures including rainwater recycling and drainage;
 - infiltration devices to allow water to soak into the ground, that can include individual soakaways and communal facilities;
 - filter strips and swales, which are vegetated features that hold and drain water downhill mimicking natural drainage patterns;
 - filter drains and porous pavements to allow rainwater and run-off to infiltrate into permeable material below ground and provide storage if needed; and
 - basins and ponds to hold excess water after rain and allow controlled discharge that avoids flooding.
- F8. Regional planning bodies and local authorities should promote the use of SUDS for the management of run-off.²⁸ Local planning authorities (LPAs) should ensure that their policies and decisions on applications support and complement Building Regulations²⁹ on sustainable rainwater drainage. These give priority to the use of infiltration drainage systems over first watercourses and then sewers.
- F9. Site layout and surface water drainage systems should cope with events that exceed the design capacity of the system, so that excess water can be safely stored on or conveyed from the site without adverse impacts.
- F10. The surface water drainage arrangements for any development site should be such that the volumes and peak flow rates of surface water leaving a developed site are no greater than the rates prior to the proposed development, unless specific off-site arrangements are made and result in the same net effect.
- F11. For new development, it may be necessary to provide surface water storage and infiltration to limit and reduce both the peak rate of discharge from the site and the total volume discharged from the site. There may be circumstances where it is appropriate for infiltration attenuation storage to be provided outside the development site, if necessary through the use of a Section 106 agreement.
- F12. It is essential that the ownership and responsibility for maintenance of every sustainable drainage element is clear; the scope for dispute kept to a minimum; and durable, long-term accountable arrangements made, such as management companies. These issues should be addressed as part of the FRA. Where the surface water system is provided solely to serve any particular development, the construction and ongoing maintenance costs should be fully funded by the developer. Section 106 agreements³⁰ may be appropriate to secure this.

²⁸ ODPM, 2005. *Planning Policy Statement 1: Delivering Sustainable Development* para. 22 website: www.communities.gov.uk/index.asp?id=1143804

²⁹ Building Regulations 2000. Approved Document H: H3 *Rainwater Drainage* website: www.planningportal.gov.uk/approveddocuments

³⁰ *Town and Country Planning Act 1990* available at www.opsi.gov.uk/ACTS/acts1990/Ukpga_19900008_en_1.htm

- F13. LPAs should work closely with the Environment Agency, Internal Drainage Boards, sewerage undertakers, navigation authorities and prospective developers to enable surface water run-off to be managed as near to its source as possible. Other organisations including highway authorities and water companies should be involved as appropriate.
- F14. RPBs and LPAs should further the use of SUDS by:
- incorporating favourable policies within Regional Spatial Strategies;
 - adopting policies for incorporating SUDS requirements in Local Development Documents;
 - encouraging developers to utilise SUDS wherever practicable in the design of development, if necessary through the use of appropriate planning conditions or by planning agreements;
 - developing joint strategies with sewerage undertakers and the Environment Agency to further encourage the use of SUDS as an aid to mitigating the rate and volume of surface water flows; and
 - promoting the use of SUDS to achieve wider benefits such as sustainable development, water quality, biodiversity and local amenity.

Annex G: Managing Residual Flood Risk

- G1. The risks remaining after applying the sequential approach and taking mitigating actions are known as the residual risks. It is the responsibility of those planning development to fully assess flood risk, propose measures to mitigate it and demonstrate that any residual risks can be safely managed. Flood resistance and resilience measures should not be used to justify development in inappropriate locations.

Development Behind Existing Defences

- G2. Following application of the Sequential Test and Exception Test (see Annex D), development should not normally be permitted where flood defences, properly maintained and in combination with agreed warning and evacuation arrangements, would not provide an acceptable standard of safety taking into account climate change. Low-lying tidal and coastal areas are particularly vulnerable, due to the residual risk of defences being overtopped or breached, resulting in fast flowing and deep water flooding. Planning authorities should take these hazards fully into account when drafting Local Development Documents (LDDs) and considering planning applications, recognising that the Environment Agency is not obliged to maintain defences. Risks will be greatest close to such defences, and local planning authorities should seek opportunities to set back developments. Planning authorities should take into account the need for access to maintain defences when considering planning applications in areas close to them.

Other Infrastructure Acting as a Flood Defence

- G3. Road and rail embankments and other existing transport infrastructure can affect water flows during floods. It is important that this is recognised, and where use of such infrastructure is proposed for flood management purposes, this is discussed with the infrastructure owners. Where new transport infrastructure is proposed, the possibility of building-in flood management measures at the design stage should be considered.

Developer Contributions

- G4. In certain circumstances, to meet the wider aims of sustainable development, it may be necessary to permit development that requires the provision of flood risk management, including defence and mitigation works. Such provision will generally be funded by the developer, and is only acceptable provided it is consistent with the relevant flood-risk management policies, passes the Sequential and Exception Tests and does not have a significant adverse impact on flood flows or storage. LDDs should include general policies about the principles and use of planning obligations for flood risk management.

- G5. Where flood risk management works are required to mitigate the risk of flooding to a proposed development or increased risk at other locations, planning authorities and developers should have regard to the following considerations regarding the contributions developers should make:
- developers cannot normally call on public resources to provide defences and other measures for their proposed developments where they are not already programmed for the protection of existing development;
 - where previously programmed defences and other measures have already been provided at public expense to protect existing development, these may also provide opportunities for new development, provided this does not itself add to flood risk at other locations;
 - for some previously developed land, public investment in land remediation and infrastructure may include an element of flood defence and mitigation investment as a means of bringing such land into beneficial use;
 - where the two preceding considerations do not apply but where other material considerations outweigh the risk of flooding, any necessary flood risk management, including defences or flood alleviation works required because of the development or which form a part of that development should normally be fully funded by the developer;
 - authorities may wish to consider entering into an agreement under Section 106 of the Town and Country Planning Act 1990³¹ to ensure that the developer carries out the necessary works and that future maintenance commitments are met. They may also apply planning conditions which would require completion of the necessary works before the rest of the development can proceed;
 - it may be appropriate to vest the resulting flood risk management measures, which have been constructed to the operating authority's satisfaction, in the operating authority, with a dedicated commuted sum to fully fund whole life maintenance and future climate change adaptability costs;
 - where such works would provide a wider benefit, the funding provided by developers may be proportional to the benefits to them. For instance, the development might fund the provision of the defences or other measures which would then be vested in and maintained by the operating authority;
 - after application of the above and all other relevant considerations, the local planning authority, having taken advice from the Environment Agency and any other relevant operating authority, should negotiate an appropriate contribution from the developer. If agreement cannot be reached on the provision of that contribution, the application should be refused.

³¹ see footnote 30

Flood Resilience and Resistance

- G6. The sequential approach (para. 14) should be applied to the layout and design of particular developments. More vulnerable uses should be directed to parts of the site at less probability and residual risk of flooding. The lower floors of buildings in areas at medium and high probability of flooding should be reserved for uses consistent with Table D.1 of Annex D. Those proposing development should seek opportunities to use multi-purpose open space for amenity, wildlife habitat and flood storage uses. Opportunities should be taken to lower flood risk by reducing the built footprint of previously-developed sites and using sustainable drainage systems (SUDS).
- G7. Where there is a low probability of limited shallow depth water entry, but not severe inundation to buildings, the use of flood-resilient construction may be considered. Guidance on the resilient construction is being prepared and can be used to support any further requirements of the Building Regulations. Information on this guidance will be placed on the Communities and Local Government and Planning Portal websites.³²
- G8. Flood-resilient buildings are designed to reduce the consequences of flooding and facilitate recovery from the effects of flooding sooner than conventional buildings. This may be achieved through the use of water-resistant materials for floors, walls and fixtures and the siting of electrical controls, cables and appliances at a higher than normal level. If the lowest floor level is raised above the predicted flood level, consideration must be given to providing access for those with restricted mobility. In considering appropriate resilience measures, it will be necessary to plan for specific circumstances and have a clear understanding of the mechanisms that lead to flooding and the nature of the flood risk by undertaking a FRA.
- G9. Flood-resistant construction can prevent entry of water or minimise the amount of water that may enter a building where there is flooding outside. This form of construction should be used with caution and accompanied by resilience measures, as effective flood exclusion may depend on occupiers ensuring some elements, such as barriers to doorways, are put in place and maintained in a good state. Buildings may also be damaged by water pressure or debris being transported by flood water. This may breach flood-excluding elements of the building and permit rapid inundation. Temporary and demountable defences are not normally appropriate for new developments.
- G10. The relative benefits of resilient and resistant construction have been assessed both through risk assessment and the real time testing of model forms of construction. Resilient construction is favoured because it can be achieved more consistently and is less likely to encourage occupiers to remain in buildings that could be inundated by rapidly rising water levels.

³² See www.communities.gov.uk or www.planningportal.gov.uk

- G11. Essential infrastructure which has to be located in flood risk areas (see Annex D) should be designed to remain operational when floods occur.

Flood Warning and Evacuation Plans

- G12. The receipt of and response to warnings of floods is an essential element in the management of the residual risk of flooding. Particular attention should be given to the communication of warnings to vulnerable people including those with impaired hearing or sight and those with restricted mobility. Attention should also be given to the communication of evacuation plans and warnings to transient occupants of camp sites, caravan sites and holiday facilities. Evacuation plans should be in place for those areas at an identified risk of flooding and should take into account that the occupiers are likely to lack local knowledge. The mobility of occupants also needs to be considered. Those proposing developments should take advice from the emergency services when producing an evacuation plan for the development as part of the FRA. Local Resilience Forums (see Annex H) should ensure that flood risk is fully considered as part of their activities, including the resilience of emergency infrastructure required to operate during floods.

Annex H: Roles and Responsibilities of Parties

- H1. This Annex supplements paras. 21–32 of this PPS. It covers key stakeholders who have a role in the planning process and the flood and coastal defence operating organisations.
- H2. Responsibilities are likely to change as the Government’s strategy for flood and coastal erosion risk management (see *Making Space for Water*) is implemented. The First Government Response to the autumn 2004 *Making Space for Water* consultation published in March 2005 included a commitment to extend the strategic role of the Environment Agency to cover sources of flooding other than from rivers, the sea and tides, and its strategic role in relation to coastal erosion risk. The aim is to implement this wider strategic role of the Environment Agency by 2009.
- H3. The Government will also be pursuing a joined-up approach to integrated urban drainage management which will include river, direct rainfall, sewer and groundwater flooding. One of the outcomes of this work will be to provide the public with clarity on the roles and responsibilities of key bodies.

The Department for Environment, Food and Rural Affairs (Defra)

- H4. Defra has overall policy responsibility for flood and coastal erosion risk in England. It funds most of the Environment Agency’s activities in this area and provides grant aid to the other flood and coastal defence operating authorities (local authorities and internal drainage boards) to support their investment in improvement works. Improvement projects funded by Defra, including those of the Environment Agency, must meet specified economic, technical and environmental criteria and achieve an appropriate “priority score” to be eligible for funding. Defra does not build defences, nor direct the authorities on what specific projects to undertake. The works programme to manage risk is driven by the operating authorities (see paras. H14–H19).

Communities and Local Government

- H5. Communities and Local Government is responsible for spatial planning policy and the operation of the planning system in England, which regulates development and the use of land in the public interest. It covers issues related principally to the location, layout and appearance of new development. Design and flood resilience issues not related to external appearance are matters for the Building Regulations also administered by Communities and Local Government.

Government Offices

- H6. Under the Flooding Direction issued in conjunction with this PPS, where a local planning authority is minded to approve a planning application for major development yet there is an Environment Agency objection to it on flood risk grounds, the application must be referred to the appropriate Government Office to consider, on behalf of the Secretary of State, whether it should be called in for determination.

- H7. Government Offices also have a role to scrutinise draft RSSs and LDDs which will include flood risk policies, and may intervene where these are inadequate.

The Highways Authorities

- H8. Local highways authorities have responsibility for managing road drainage from roads on the local road network, in so far as ensuring that drains which are their responsibility are maintained. The Highways Agency is responsible for managing road drainage from the trunk road network in England, including the slip roads to and from trunk roads.

Sewerage Undertakers

- H9. Sewerage undertakers are generally responsible for surface water drainage from development via adopted sewers and in some instances SUDS. They should ensure that Urban Drainage Plans reflect the appropriate Regional Spatial Strategies (RSSs) and Local Development Documents (LDDs) in line with their obligations in the current legislation and their Asset Management Plans (AMPs).

Reservoir Undertakers

- H10. Certain reservoir undertakers will be required to produce emergency contingency plans (Flood Plans), following direction by the Secretary of State under the Reservoirs Act 1975, as amended. This requirement will be introduced following consultation by Defra. The presence of reservoirs and implications for flood risk should be recognised in Regional Flood Risk Appraisals (RFRAs), Strategic Flood Risk Assessments (SFRAs) and Flood Risk Assessments (FRAs). Flood risk assessments should take into account information received from the reservoir undertakers and Flood Plans when they are available and relevant. Where the consequences of dam failure could endanger life, a reservoir has to be designed to cope with floods of greater severity than those where the consequences of failure would have negligible risk to life. It follows that proposed development downstream could have cost implications if it required upgrading works for the reservoir.

Emergency Services and Multi-Agency Emergency Planning

- H11. The Civil Contingencies Act 2004 and associated Regulations sets out an emergency preparedness framework, including planning for and response to emergencies. Local Resilience Forums, which include representatives from the Emergency Services, Local Authorities and the Environment Agency, should ensure that risks from flooding are fully considered, including the resilience of emergency infrastructure that will have to operate during floods. Emergency Services should be consulted during the preparation of LDDs and the consideration of planning applications where emergency evacuation requirements are an issue.

The Insurance Industry

- H12. Developments at risk of flooding may increasingly face difficulties with the cost or availability of insurance. This, in turn, could cause problems for property buyers in obtaining mortgages. In extreme cases, properties might remain unsold, leading to blight. The Association of British Insurers and the Council of Mortgage Lenders will comment on individual proposals on which the Environment Agency object and where there appears to be a high risk. Those proposing development, especially speculative investment, are advised to consult ABI guidance³³ at an early stage in order to understand the insurance industries concerns. The insurance industry may wish to seek to reduce the risk exposure by making appropriate representations about proposals for the location of new development during the preparation of development plans.

The Community

- H13. Community involvement is an essential element in delivering sustainable development and creating sustainable and safe communities.³⁴ The Planning and Compulsory Purchase Act 2004 requires regional planning bodies and local planning authorities to prepare a Statement of Community Involvement, in which they set out their policy on involving their community in preparing RSSs and LDDs and on consulting on planning applications. This should include community engagement on flood risk issues across the wide range of stakeholders including those mentioned above and community groups. The Disability Discrimination Act 2005 and its codes of practice require that disabled people are included in any such engagement.

Operating Authorities

- H14. An operating authority is any body, including the Environment Agency, LPAs and Internal Drainage Boards which has power to make or maintain works for the drainage of land.

The Environment Agency

- H15. The Environment Agency was established by the Environment Act 1995 and is a Non-Departmental Public Body of Defra. It is the principal flood defence operating authority in England. Under the Water Resources Act 1991, the Environment Agency has permissive powers for the management of flood risk arising from designated Main Rivers and the sea. The Environment Agency is also responsible for flood forecasting and flood warning dissemination, and for exercising a general supervision over matters relating to flood defence.

³³ ABI 2003 *Development planning and flood risk* <http://www.abi.org.uk/Display/File/Child/553/ance2.pdf>

³⁴ See footnote 11.

- H16. The Environment Agency is required to arrange for all its flood defence functions (except certain financial ones) to be carried out by Regional Flood Defence Committees (RFDCs) under s106 of the Water Resources Act 1991. In order to carry out these functions, the Environment Agency through the RFDCs has various statutory powers including the following:
- to maintain or improve any watercourses which are designed as Main Rivers;
 - to maintain or improve any sea or tidal defences;
 - to install and operate flood warning equipment;
 - to control actions by riparian owners and occupiers which might interfere with the free flow of watercourses; and
 - to supervise internal drainage boards.
- H17. The RFDCs are required to take an interest in all flood matters in their area and in particular to take decisions about the annual programmes of improvement and maintenance work to be carried out by the Environment Agency.

Local Authorities

- H18. Local authorities have certain permissive powers to undertake flood defence works under the Land Drainage Act 1991 on watercourses which have not been designated as Main Rivers and which are not within Internal Drainage Board areas. There are also over 80 maritime district councils which have powers to protect the land against coastal erosion under the Coastal Protection Act 1949. Local authorities can control the culverting of watercourses under s263 of the Public Health Act 1936.

Internal Drainage Boards

- H19. Internal Drainage Boards (IDBs) are independent bodies, created under various statutes to manage land drainage in areas of special drainage need. These areas include not only agricultural land but also large urban areas. There are over 100 Boards in England, concentrated in the lowland areas of East Anglia, Somerset, Yorkshire and Lincolnshire. Each Board operates within a defined area in which they have permissive powers under the Land Drainage Act 1991 to undertake flood defence works, other than on watercourses that have been designated as 'Main'.

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