Flood Risk Assessments

Guidance note for Local Authorities

Adam Broadhead and Kat Gorham

Summer 2010

Water21

(Department of Vision21 Ltd)

30 St Georges Place

Cheltenham

GL50 3JZ

01242 224321

ABSTRACT: This paper responds to a need for Local Planning Authorities to understand better ways of interpreting Flood Risk for planning and sustainable development policies. It also provides an overview of the main roles and responsibilities of the various stakeholders.

Contents

With acknowledgements and thanks to independent consultant hydrologist Katherine Colby for advice preparing this report.

1 Introduction

In England and Wales, 5 million people and £250 billion of assets are at risk from flooding from various sources (DEFRA 2001). Annual government expenditure on flood defence has risen year on year since 2007 and has reached £800 million now in 2010 (DEFRA 2007). Flood risk from various sources, including rivers, surface waters and sewers, must be managed cost-effectively.

New and existing developments play a key role in both preventing further flood risk and potentially addressing existing flood risk. This paper has arisen in direct response to requests from local authorities (LAs) to provide information on Flood Risk Assessments (FRAs) to clarify roles and responsibilities and better enable them to ensure sustainable development in this respect.

A key approach of new legislation, particularly since *Agenda21* (UN DESA 1992), *Making Space for Water* (DEFRA 2005) and the *EU Water Framework Directive*, has been that of partnerships and participation between various government authorities, agencies, charities, communities and stakeholders. This paper contributes towards a partnership approach by providing consultation on FRAs for LAs.

It seeks to resolve several key questions, drawing on key government policy determinants as well as practical experience, namely:

- How far does the scope of the FRA need to go?
- Should FRAs include resolving raised flood risk arising from the proposed development to the wider catchment?
- Who is charged with proper interpretation of the effectiveness of the FRA?
- What measures of effectiveness or methods of assessment are available for understanding and interpreting FRAs?

2 Policy and Flood Risk Assessment

2.1 General principles

The Government's *Planning Policy Statement 25: Development and Flood Risk* (PPS25) (DCLG 2006) promotes sustainable development, and is the **key reference for planning guidance with regards to flood risk management**. Risk is clearly defined as the product of the probability of a flood event occurring and the potential for damage.

PPS25 aims to:

> *avoid, reduce and manage 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.*
>
> *PPS25, paragraph 4*

This is therefore interpreted as a requirement to consider not only the flood risk to proposed developments, but also the **wider implications** of the development on the flood risk outside of the bounds of the proposed development, within a **'fully accounted catchment hydraulic model'**.

This interpretation, requiring consideration as to the effects of any proposed new development on wider flood risk, is backed by the aim to:

> *reduce flood risk to and from new development through location, layout and design, incorporating sustainable drainage systems (SuDS)...*
>
> *PPS25, paragraph 6*

PPS25 also suggests that existing flood risk in catchments can be reduced by:

> *using opportunities offered by new development to reduce the causes and impacts of flooding...*
>
> *PPS25, paragraph 6*

In the spirit of PPS25, the above statement should be interpreted as a call to reverse and mitigate the elevated flood risk attributed to **any legacy of prior development** with insufficient SuDS or limited consideration of wider flood impacts.

Specifically, **Local Planning Authorities (LPAs) should follow PPS25 in developing and applying their local planning policies and in considering planning applications**. They should:

> *ensure that planning applications are supported by site-specific flood risk assessments (FRAs) as appropriate;*
>
> *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 [ensure] that any residual risk can be safely managed.*
>
> *PPS25, paragraph 8*

The *Flood and Water Management Act 2010* advises that specific standards for SuDS will be published by the Secretary of State for use by developers in designing sustainable developments and LAs in assessing flood risk to and from proposed developments (*Schedule 3 – Sustainable Drainage*).

Consideration of flood risk from older developments may necessitate the need for retrofitting SuDS. This is often feasible and there is substantial guidance available (e.g. Speirs 2006; Stovin et al 2007; and the Retrofit SuDS Research Group website at http://retrofit-suds.group.shef.ac.uk/index.html).

2.2 Planning context of Flood Risk Assessments

For those developments requiring Planning Permission, many will require FRAs, and some may also require more detailed Environmental Impact Assessments. FRAs are required for almost all major developments (defined in PPS25 Annex) and also those developments within flood risk zones 2 or 3 (defined by the Environment Agency's flood maps). The Regional and Strategic Flood Risk Assessments (RFRA and SFRA) should identify those at-risk areas requiring FRAs locally.

The FRA is an integral part of planning for sustainable development, and is achieved at different levels throughout planning process (Figure 1). FRAs are therefore informed via a complex hierarchy of broader flood risk appraisals and planning strategies.

Local Planning Authorities are directly responsible in setting out the conditions required of any FRA in their Local Development Documents. These take into account flooding issues within the catchment context of the local area, and give the LPA an opportunity to specify the requirements best suited to resolving flood risk while achieving sustainable development, in the spirit of PPS25,

to meet their local needs; this mechanism can only meaningfully be defined and determined within a **'fully accounted catchment hydraulic model'**.

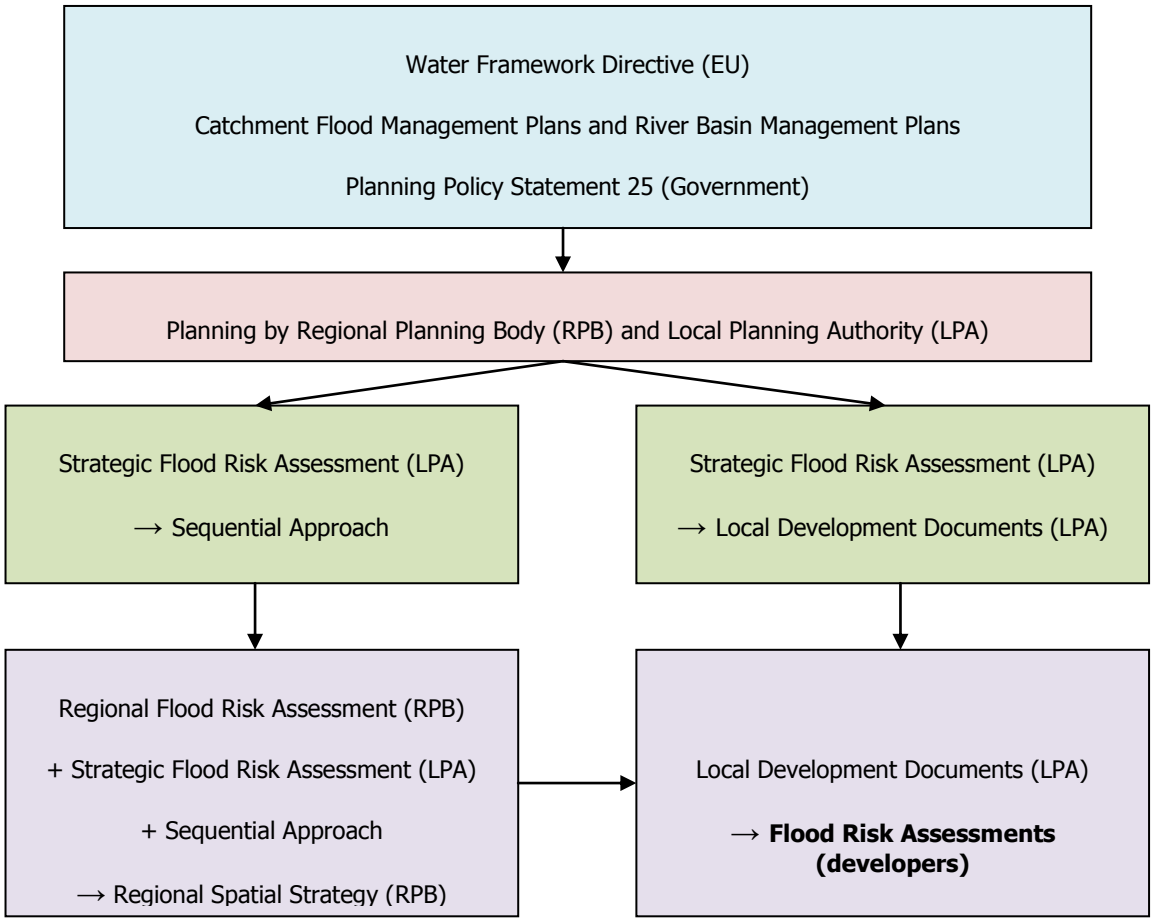

Figure 1. Planning policy hierarchy relating to local development and flood risk assessment.

In light of the *Flood and Water Management Act 2010,* the LPA is the Lead Local Flood Authority (LLFA) responsible for the local flood risk management, usually at the County Council level.

The Regional Planning Body (RPB) also has a direct role in this process by developing the Regional Spatial Strategy (RSS) which identifies suitable areas for development, by applying a sequential, risk-based approach. Developments are prioritised in low flood risk zones, but higher flood risk zones may be considered for certain types of development. Details of this Sequential Approach and Exceptions Test are found in the PPS25 document, Annex D.

The Local Development Documents (LDDs) should uphold the aim of sustainable development and effective flood risk management, and:

> *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...*
>
> *PPS25, paragraph 16*

Existing flood risk areas are defined by the Environment Agency but further research, incorporated with local knowledge of flooding, may help to improve the accuracy of the information in many circumstances. **It is the recommendation of Water21 that LAs and the Environment Agency should encourage local community participation to support the accuracy of their flood risk mapping.** Developments within these flood risk areas can then be required in the LDDs, with a strong level of confidence, to submit FRAs for planning permission.

There is also a greater need for Regional Flood Risk Assessments (RFRAs) and planning documents to consider planning applications in terms of their potential to increase surrounding flood risk, by identifying currently at-risk areas where flooding should not be exacerbated.

The developer must fully provide what has been required by the LPA for planning permission. The LPA must then determine the effectiveness of the submitted FRA and any remedial action, calling on the Environment Agency where necessary for advice and a position statement on the proposed development on flood risk grounds.

2.3 Roles and responsibilities for flood planning

With the complex hierarchy of policies leading to a FRA, roles and responsibilities must be clearly defined. These are detailed in PPS25, paragraphs 21-34 and in Annex H. The key information is summarised in this section.The stakeholders are ordered broadly from the bottom up (Figure 2).

Landowners have primary responsibility to protect their own land from flooding and to control drainage to prevent, as far as reasonably practicable, flooding on neighbouring land.

Developers are responsible for:

- Demonstrating the development is consistent with PPS25 and LDD;
- Providing a FRA, in consultation with the LPA, to demonstrate how flood risk both on site and any additional to the wider catchment is being managed;
- Design of suitable SuDS and flood resilience measures; and
- Identifying opportunities to reduce flood risk and enhance the environment in the wider catchment.

Figure 2. Heirarchy of flood and water management, viewed as a bottom up control.

The RPB prepares the RSS and helps to make the RFRA, which identifies flood risk to regionally strategic locations.

LPAs make the LDDs. The *Town and Country Planning (General Development Procedure) Order 1995*, requires LPAs to consult the Environment Agency on all applications for development in flood risk areas (except minor development), areas with critical drainage problems, and all developments larger than 1 ha outside of flood risk areas. This last point recognises the impact of development on catchment flood problems, and guidance in Annex D provides guidance on smaller cumulative developments having the same impact. The *Town and Country Planning (Flooding) (England) Direction 2007* gives clear step-by-step advice on this:

1. If there are objections to the development on flood risk grounds and the LPA wishes the development to go ahead, the LPA must contact the Environment Agency with an aim to resolving the issues.

2. The LPA must, being advised by the Environment Agency, consider the applications.

3. If the Environment Agency objects to a major development on flood risk grounds, the Environment Agency, the LPA and the applicant must discuss the matter to enable the Environment Agency to withdraw its objection.

4. If the LPA still wishes to approve a major development, but the Environment Agency maintains its objections, the LPA must notify the Secretary of State.

5. The Secretary of State can review the application in light of compliance to PPS25 and determine whether to approve development.

6. LPAs should notify the Environment Agency for development in flood risk areas, and other bodies where appropriate.

When a development may be affected by, or may add to flood risk, pre-application discussions with the relevant bodies should be arranged by the LPA. The LPA can set out its requirements for FRAs and the application to allow them to make a decision.

The Environment Agency has a statutory responsibility for flood management in England. It must provide timely and appropriate advice throughout the planning system, including the preparation of RFRAs and SFRAs. It is the statutory consultee for preparing the RSS and LDD, for strategic environmental assessment and sustainability appraisal, and for environmental impact assessment. The Environment Agency must be consulted by the LPA for all development applications in flood risk areas and should provide advice, including for major developments.

The government has no overall statutory responsibility to protect people or property from flooding, but it recognises an indirect responsibility to help here by setting out general policies for local implementation of appropriate measures.

2.3.1 Update: the Flood and Water Management Act 2010

While the hierarchy described above remains generally in place with the new *Flood and Water Management Act 2010*, the management has been specifically streamlined into two key responsibility areas.

The Environment Agency is responsible for national flood risk management and as such must issue a National Flood and Coastal Erosion Risk Management Strategy, and has powers to carry out sea defence, main river and coastal protection works.

The new Lead Local Flood Authority designates responsibility for local flood risk. In most cases it is at the level of the County Council, who must issue Local Flood Risk Management Strategies for surface water run-off, groundwater and non-main rivers

and have powers to carry out works for the management of surface water run-off and groundwater.

Internal Drainage Boards and Local Authorities continue with their powers to carry out works on non-main rivers, and the drainage powers and duties of highway authorities and sewerage undertakers remain in place.

There is no explicit detail of the role of the Local Authority in co-operation with the Lead Local Flood Authority, except that all relevant bodies must co-operate and share information in achieving the aims of the Act.

3 Guidelines for interpreting the Flood Risk Assessment

3.1 Roles and responsibilities

The Approving Body (as in the *Flood and Water Management Act 2010*) is responsible for interpreting the FRA when making a decision on a planning application. This is usually the LPA (District Council, or where unavailable, the County Council). **The LPA can grant or refuse planning permission on grounds of an unsatisfactory FRA.**

The Environment Agency will provide advice and information, depending on the scale and risk of the proposed development. The Environment Agency can either raise no objection, or object to the proposal based on the information provided. The interactive Standing Advice on FRAs to LAs is a good place to begin (EA 2010), and can be downloaded from: http://www.environment-agency.gov.uk/static/documents/Research/New_FRSA_system_25_06_092_LPA.pdf .

3.2 Requirements of Flood Risk Assessments

While there are grounds for the developer to appeal as far as the Secretary of State, it is in best interests for all parties to work to identify ways of creating a satisfactory FRA for the development.

Guidelines for interpreting the FRA should initially be determined by the LPA in the LDD. The LDD can require of planning applications:

- Demonstration of feasibility for SuDS, including ponds, swales, rainwater harvesting, grey-water recycling.
- Prohibition of drainage into rivers without prior attenuation.
- Minimum design standards to define the amount of attenuation.
- Consideration of the visual, ecological, and hydromorphological impacts of proposed SuDS implementation.
- Enhancement of ecological conditions to work alongside wider goals and plans, such as the Water Framework Directive; Biodiversity Action Plans etc.
- Management of rain runoff at source rather than downstream at flood areas.
- Encouragement of strategic groundwater recharge, only where appropriate.
- Enhancement of water quality.

To appropriately appraise FRAs, quantitative standards may be easier to interpret than qualitative requirements for managing flooding. **The LDD may include sufficient general principles for developers to adhere to in order that the LPA, in its role as the Approving Body, may have confidence to properly**

interpret and review submitted FRAs, and refuse Planning Permission on flood risk grounds where appropriate.

Additional information on FRA requirements and interpretation may be supplied by best-practice guidance notes, working with a number of stakeholders, including developers, SuDS experts and the Environment Agency.

The scope of an FRA is given below (DCLG 2007) (Figure 3).

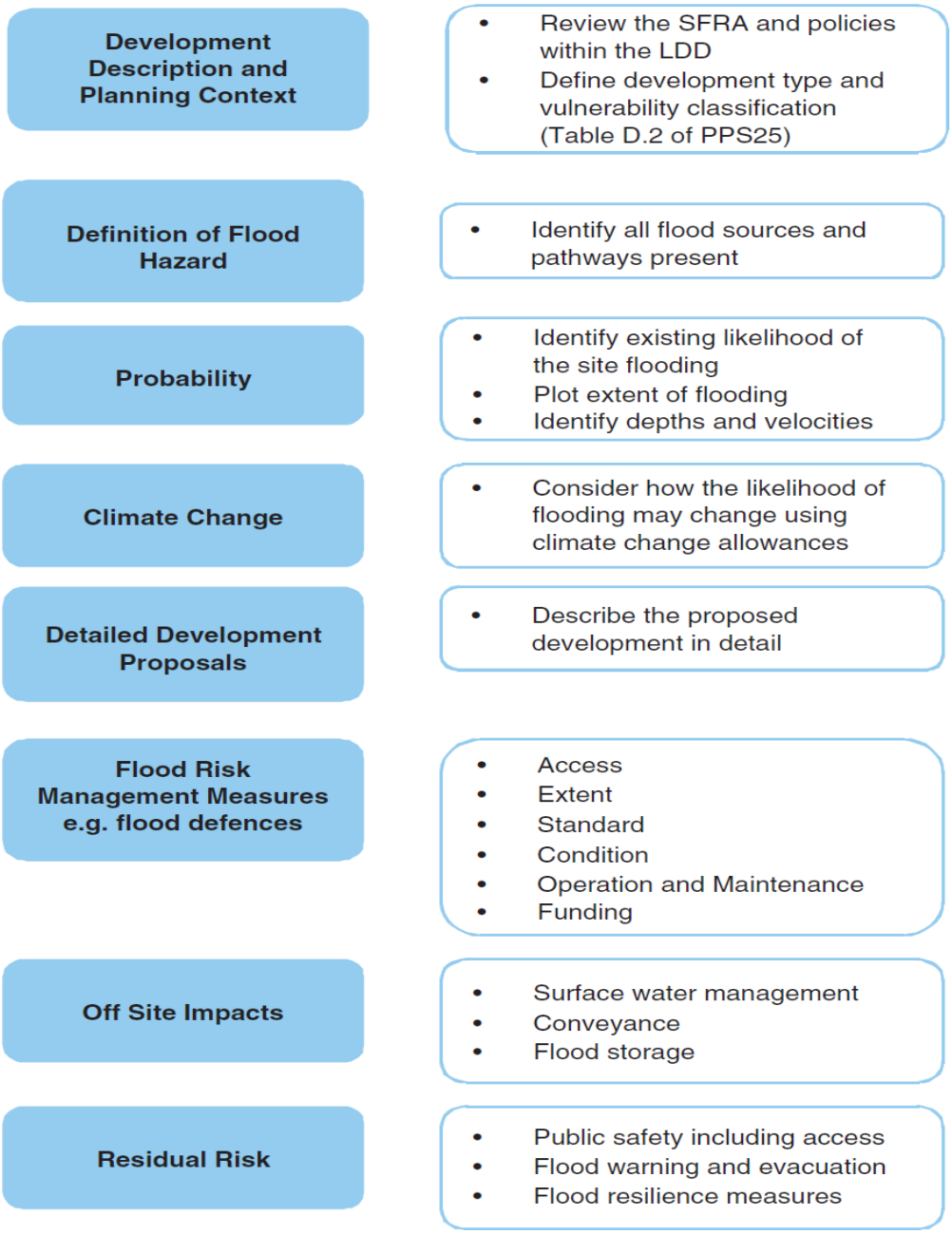

Figure 3. Scope of a Flood Risk Assessment. Source: DCLG 2007.

3.3 Interpretation of Flood Risk Assessments

In practice, the success of the FRA and sustainable development policy depends on the interpretation, implementation and enforcement of the policies. Some examples are given here to illustrate the importance of the guidance wording in the LDD.

The LDD should specify appropriate requirements that the LPA can confidently interpret and enforce.

Enforcement of good flood risk management principles in proposed developments can become difficult when policy wording is too general, or too specific.

If the wording in the LDD is a general principle, it could be difficult to enforce because it is so broad that it would make it difficult for the developer to understand the required design standard for SuDS. As below:

> *"Developments should not cause flood risk"*

Subjective phrasing is also very difficult to enforce, as the developer could define this in different ways. What is unacceptable? And would this account for existing flood risk? As below:

> *"The development must not cause unacceptable flood risk"*

However, if the requirements of the LDD are too specific, they may present no opportunity for discretion in the decision making process or may be too unforgiving of relatively good FRA applications. How confident can a LPA be in setting minimum design standards to annual flood probability, and how confident can they be that a developer has accurately accounted for this in their design, given all the uncertainties and estimations? A stipulation to require a quantitative increase in the WFD scoring is noble, but is too specific in the example below and would be better noted as a general principle. As below:

> *"development must not cause an increase in run off any greater than would exist from the greenfield undeveloped site for events up to a 1 in 200 year annual probability, and must, for major developments, demonstrate actions which compensate for cumulative flooding problems and improve Water Framework Directive water status by one level in the catchment"*

The LDD must therefore offer planning guidance that the developer can confidently understand and interpret, and that the LPA can confidently enforce. A specific principle such as in the example below would be an appropriate starting point for planning guidance:

> *"development must not cause an increase in run off any greater than would exist from the greenfield undeveloped site"*

Thorough practical interpretation advice can be found in the PPS25 Guidance (DCLG 2007).

3.4 Standards of Flood Risk Assessment

The guiding principle for interpretation of the effectiveness of an FRA must be that actions have been taken to manage any arising changes in hydrology to ensure that risk of flooding onto and also from the development is minimised. This will often mean incorporating quality SuDS into the development to compensate and enhance, in quantitative terms, the additional runoff and environment both on site, and downstream of the development.

In this way, the development should neither exhibit risk of flooding itself, nor present additional flood risk to others in the catchment. It is the position of Water21 that the SuDS should also contribute towards mitigating residual flood risk in the catchment where appropriately defined in the LDD. This is entirely feasible. Many examples are provided in PPS25 Practice Guidance (DCLG 2007), and two are reproduced below for reference.

Example 1 – Thames Valley Park, Reading – an example of how new development can be compatible with reductions in flood risk as well as improved amenity and biodiversity.

This Business Park consists of a low density campus-style development with extensive landscaping and wetland features, providing corporate premises for companies as well as services such as shops, sporting and leisure facilities. It forms a large triangle of land north east of Reading bounded by the River Thames to the north and the London-Bristol railway line to the south. The development was associated with the creation of a 37 hectare country park and nature reserve, improved public access and provision of improved flood defences.

The site was prepared by removing the original topsoil, extracting the gravel, disposing pulverised fuel ash in a cell within the void created and then replacing the original topsoil. The earthworks on the site were designed so as to compensate for loss of flood storage and to open up flood flow routes.

A nature reserve was established as part of the development. This involved creating lakes, islands and wetland areas which were planted with reedbeds and other appropriate vegetation. The rest of the area adjacent to the river formed a country park, which was seeded with a wildflower grass seed mix and is managed for a variety of conservation and low-key recreation purposes. The former cooling water channel was also enhanced. The footpath along the river is part of the Thames Path.

Example 2 – The Avenue Site, Chesterfield – example of organisations working together to help reduce flood risk and create wetland habitats

This ongoing project is involving the restoration and de-contamination of a major former coking works to the South of Chesterfield by the East Midlands Development Agency (EMDA). The restored site will incorporate sustainable drainage systems, significant areas of new wetland, a flood storage area and a restored section of the River Rother. The project will result in reductions in flood risk downstream in Chesterfield. A steering group comprising, amongst others, EMDA, the Environment Agency and Derbyshire Wildlife Trust (DWT), continue to guide this project and DWT will be paid a commuted sum for maintenance of the new wetland habitat on completion.

The appropriate standard for flood protection is not strictly defined in legislation, as this will be determined in a local context and based on the type of proposed development and its vulnerability to the impacts of, or for, flooding.

However, in designing flood alleviation works, the Environment Agency often works to provide a standard 1 in 100 year protection, with an additional "+10%" to account for potential climate change risks. This is corroborated by the PPS25 Practice Guidance (DCLG 2007), wherein it suggests some minimum design standards encouraged by the Insurance Industry:

> *"5.4 The Association of British Insurer's Statement of Principles, re-issued in 2006, contains a commitment to provide flood cover as a standard feature of existing household and small business policies protected to a 1.3 per cent annual exceedence probability, AEP, (**1 in 75 years**) or greater. Where properties are not protected to this standard, insurers will maintain flood cover for existing domestic properties and small businesses that they already insure, where improvements in flood protection schemes sufficient to reduce the likelihood of flooding to 1.3 per cent AEP or less are scheduled for completion within the next five years.*
>
> *5.5 **The minimum acceptable standard of protection against flooding for new property within flood risk areas is [1 in 100 years**] 1 per cent AEP (river flooding) and 0.5 per cent AEP (flooding from the sea), including an appropriate allowance for climate change. Wherever a greatly increased standard of protection can be achieved at little extra cost, then such opportunities should always be taken."*
>
> *PPS25 Guidance (DCLG 2007), paragraphs 5.4 to 5.5*

It also suggests that within the development, surface flooding of open spaces (e.g. car parks or landscaped areas) may be flooded at the 1 in 30 year return flood event for short periods, where appropriate and safe.

An FRA is approvable on flood risk grounds where it demonstrates:

- that it has accounted for these minimum design standards; and
- that it manages on and near site flood risk through appropriate measures that will not contribute to increasing flood risk elsewhere.

4 Water 21 position on best-practice Flood Risk Management

This section provides an overview of the approaches to managing flood risk for a proposed development. **This is what Water21 considers to be best-practice**. However, the list is not exhaustive and the reader is directed to existing guidance (DCLG 2007). This best-practice generally goes beyond requirements in legislation and addresses particular issues of managing catchment flood risk in a long term, sustainable and low cost manner.

1. Identify whether the site lies within a flood risk zone, using the Environment Agency flood mapping and supporting this with local knowledge to confirm or improve the decision.

2. Identify whether the site lies within or near a catchment with existing flood risk problems.

    - Taking the whole, or 'holistic', view is the cornerstone of any successful sustainable development. Similarly, any successful community flood management plan (which should also address wider community interests in sustainability, such as public health, food and energy security etc) needs to be based on a whole river catchment hydraulic model.

3. Using LDD, SFRA and RFRA plans, identify whether the site lies within a zone which could actively contribute to catchment wide flood management by controlling and managing existing legacy runoff.

4. Quantify the runoff from the existing undeveloped "greenfield" site. This is the benchmark for minimum design standards.

    - Any development should, as a minimum, control hydrological changes such that the runoff from the land does not impact surrounding areas.

    - This means preserving natural infiltration rates and runoff rates and, wherever possible, enhancing natural infiltration, natural storage, biodiversity and habitats in accordance with existing plans.

    - As such, the calculations for "greenfield" runoff should attempt to account for what the natural hydrology would be before disturbances elsewhere in the catchment. For example, a site below agricultural fields may have higher "greenfield" runoff rates since intensification of agriculture and corresponding increases in surface runoff over recent

decades, which have contributed in some level to increasing flood risk downstream.

- This becomes an opportunity to identify a best-case for developing whilst managing existing flood risk within the catchment in a strategic and sustainable manner.

5. Demonstrate that the development can maintain "greenfield" runoff and infiltration rates.

    - SuDS measures can include permeable paving, rainwater harvesting, detention basins, swales, green roofs, cisterns, water butts and flood proofing for a combination of flood mitigation, prevention and resilience measures.

    - Where possible, low cost, lower maintenance, multi-beneficial, naturalistic measures should be employed (such as floodable amenity land with biodiversity benefits) rather than highly engineered approaches.

    - Demonstrate that the development, including the proposed flood mitigation measures will not contribute to increased flood risk elsewhere in the catchment.

    - For sites of minimal size, land take is an issue, and guidance exists on SuDS design in small areas (DCLG 2007).

6. When the site lies within a catchment experiencing flood risk, the precautionary principle should be adopted.

    - Many downstream areas are suffering worsened flood problems from the cumulative effects of development and land management changes in the catchment.

    - In such a case, this should be explicitly highlighted in the LDD and planning guidance to developers. There should be a requirement for SuDS to also have their design capacity increased as part of a strategic flood risk management plan to resolve the catchment issues.

    - The minimum design standard should generally be a 1 in 100 year protection to homes, and wherever possible this should be exceeded, perhaps by encouraging a collaborative approach between developers in the LDD.

- Care needs be taken in the placement of SuDS schemes within areas of high flood risk. Washout of such systems renders them pointless – these can only be meaningfully implemented in areas of minimal or no flood risk – or placed contextually within a properly planned hydraulic catchment model (even the biggest river catchments can be thus modelled and planned, normally on a sub-catchment basis).

7. Increase design capacity for flood any flood attenuation to account for the possible effects of climate change, typically by increasing storage by at least 10%.

8. Prevent (and enforce) discharge of uncontrolled drainage into rivers and streams without prior attenuation.

    - As a general principle, measures to increase conveyance in watercourses by removing vegetation, straightening, deepening and other engineering can only contribute to elevating catchment flood risk elsewhere. Small but repeated occurrences of this management will have contributed to the present raised flood risk in many catchments.

    - There should be a general presumption against drainage of surface waters to rivers through drains. Technologies exist to slow this flow artificially to simulate natural "greenfield" runoff rates, and the drainage infrastructure and associated costs can be avoided through multi-beneficial SuDS measures, if properly designed.

9. The drainage design should ensure that urban runoff be treated for pollutants through appropriately designed SuDS before drainage offsite.

    - **Causing or knowingly permitting contaminated road runoff to enter watercourses breaks the law** under the *Water Resources Act 1991 Section 85*).

    - Many sites drain directly or indirectly into watercourses, and a precautionary principle should be adopted to tackle water quality problems in line with legally binding *Water Framework Directive* prerogatives.

10. SuDS should be designed in such as manner as to provide multi-benefit.

    - They should improve and enhance the visual and ecological conditions of the area.

    - Multi-benefits such as soil erosion management, local amenity area provision, habitats and wildlife areas, climatic (temperature) buffering,

water resource recovery for re-use, etc, can all directly or indirectly contribute to the ongoing management and success of any flood management measures.

11. SuDS require maintenance, and the developer should clearly indicate an ongoing plan for this.

- Surface water drainage, and any accompanying charges for providing such service is a normal contractual matter, usually provided in urban locations by the local Statutory Water Company.

- SuDS provides a novel opportunity through the need to address maintenance costs, for new business arrangements if the local Water Company has no interest in this. This is an opportunity for local community groups, co-operatives, landowners, even local authority parks departments (such an approach may well be a transitional step to the return of municipal water infrastructure under Local Authority, as was prior to 1974 in UK).

- Responsibility for maintaining drainage infrastructure will depend on either adoption of such facilities by a local Water Company, or, a wide range of other permutations of contracted arrangements. In any case each individual householder is responsible for meeting such costs.

- SuDS type infrastructure to capture and control sewer surcharges (arising through lack of capital for conventional sewer replacement) will increasingly mean these are likely to feature in urban (mainly fringe) areas. There will be opportunities to combine these facilities to receive surface drainage in addition to that from surcharging sewers.

5 Question and answer

How far should you go to compensate and enhance current conditions?

Ultimately the development should exhibit no difference to the hydrology of the pre-development or natural site. This should be true for small rainfall or flood events, as well as for extreme events, and even account for potential future exacerbation by climate change. SuDs can be "over-designed" to compensate both for the effects of the development concerned, as well as to mitigate existing water problems in the catchment (intensified by cumulative developments and hydrological changes), and enhance the local environment. To achieve this, reference should be made to strategic flood planning such that development, where possible, should be designed to alleviate and enhance in the most at risk catchments.

What are the reference conditions to work towards, and how far back do you go to achieve a "natural" flood response?

The current "greenfield" runoff rate may have been increased by the changes upstream in the catchment. Causes are often by increased agricultural runoff, urban development, deforestation, drainage and exacerbations of intense or prolonged rainfall events by climate change. Therefore the real runoff rates to be built into design of the development must be carefully determined to account and compensate for this. Pristine conditions are not possible in most cases because development exists and to return to natural conditions is unrealistic. Furthermore, there may be opportunity to attenuate and enhance beyond the original natural conditions to provide additional ecological and flood risk alleviation benefit. If developments can be designed to provide wider benefit as a part of sustainable development principles, then this should be determined in a local context by the LPA and by the communities concerned.

To what extent should developments be expected to consider and mitigate the effects of legacy cumulative flood risk problems?

This is an argument of "polluter pays" versus "benefiter pays", i.e. finding the original culprits of poor development and land use changes which have contributed to elevated flood risk, versus asking the new developments to pay to mitigate the problem for their benefit. It would be unfair and impracticable for a developer to compensate for an entire legacy of additional runoff from developments, but a responsible development in-keeping with PPS25 would nevertheless:

- seek to entirely mitigate the additional runoff produced by the development;
- seek to contribute to mitigating the increased runoff elsewhere in the catchment.

This highlights the need for a strategic catchment flood management plan to identify flooding causes and flood risk areas on a local, catchment scale, and this could be

integrated with other holistic management approaches at other locations in the catchment.

Reference should be made to this catchment flood management plan within the spatial planning for development. This would identify the areas with elevated runoff and flood problems, and identify locations suitable for attenuating floodwaters to prevent worsening and eventually reduce the problem.

How far downstream should a development be responsible for in potentially contributing to flood risk? How far is it feasible to determine a causal link between development and elevated flood risk?

Flooding is complex. In principle, any development which increases runoff could elevate flood risk at any point downstream, and this is accounted for in PPS25 by highlighting the need to retain water on the land. However, identifying the actual culprit is very difficult because of the complex spatial and temporal characteristics of rivers and floodwaters and because of the diverse, existing legacy of cumulative developments and land use changes which are contributing to the increased flood risk in most areas. Flood risk can be created simply by building in locations which would normally flood, but in some cases also by developing land which would not otherwise have flooded; capturing any likely increase in rainfall run-off is key to a successful overall plan.

In order to be able to reliably enforce good flood risk management in developments, there must be a clear demonstration that any development does not contribute to changes in flooding patterns, frequencies or magnitudes elsewhere in the catchment. This is very difficult; the effect of a very large development may be quite clear as a "point source" problem, but most developments are smaller scale and the cumulative effect of many of these (including the effects of land use change, developments requiring no FRA, and historic legacy development) may cause flooding problems which are unaccounted for.

Therefore, all developments should as a point of principle have effective consideration of sustainable, future-proof drainage in order to be granted planning permission. They must not discharge directly into rivers without attenuation and indeed water treatment; the onus should be on attenuation not drainage, and this is encapsulated in quality SuDS schemes.

The local authority should also recognise in granting planning permission that flood risk is dynamic and negligible impacts may accumulate to cause a bigger problem where there was none previously. Such risk can only be accounted for within a finite hydraulic catchment model.

The spatial information on flood risk should also be subject to scrutiny, because it does not always include adequate representation of localised pluvial flood risk or groundwater flood risk and local knowledge should be incorporated into this. Flood

return periods are often misunderstand and misrepresented in the media, and this also causes some issues in communicating with stakeholders.

How far should indigenous knowledge be used to contribute to understanding and managing flood risk?

Development must be proactive in terms of solving flood risk in the catchment and enhancing the environment and ecology. LPAs should proactively include flood risk management plans and water management in their local development plans. Many data sources (such as the Environment Agency flood zone mapping) and calculations (such as "greenfield" runoff estimation) have inherent limitations and errors. Water21 encourages local knowledge to be incorporated into FRA consultation as part of a supportive participatory approach. This is particularly important in encouraging landowners to volunteer land areas for flood attenuation – this can usually be arranged as a secondary feature of some water resource function, eg hydropower, fisheries, irrigation reservoirs etc. Such potential water resource usage should be estimated as a part of local economic, as well as flood planning.

Where can I find more information on interpretation and practical guidance for PPS25?

The reader is encouraged to read the reference list following for more useful guidance.

The key texts are:

- Planning Policy Statement 25 (DCLG 2006);
- PPS25 Practice Guidance (DCLG 2007).

The Guidance note contains many useful case studies of good and poor practice.

Water21 promotes a collaborative approach to sustainable water management, including participatory acceptance of local communities, landowners, developers, LAs, the Environment Agency and all other interested stakeholders.

To support sustainable flood risk management in the catchment, Water21 encourages the LA to take part in or organise a "design charrette" to explore the problems, opportunities, and areas for attention in the local catchment with interested stakeholders.

6 References

Department for Communities and Local Government (DCLG) (2006) *Planning Policy Statement 25: Development and Flood Risk*, Norwich: The Stationary Office.

Department for Communities and Local Government (DCLG) (2007) *Development and Flood Risk: A Practice Guide Companion to PPS25: 'Living Draft' Consultation Paper*, Norwich: The Stationary Office.

Department for the Environment, Food and Rural Affairs (DEFRA) (2005) *Making Space for Water*, London: Department for Environment, Food and Rural Affairs.

Environment Agency (2010) *Standing Advice for Local Authorities on Flood Risk Assessments* (WWW), Bristol: Environment Agency. (http://www.environment-agency.gov.uk/static/documents/Research/New_FRSA_system_25_06_092_LPA.pdf; 17.06.10).

Speirs, I. (2006) *Retrofitting sustainable urban water solutions* (WWW), Edinburgh: Scottish and Northern Ireland Forum for Environmental Research. (http://retrofit-suds.group.shef.ac.uk/downloads/UE3%2805%29UW5%5B1%5D.pdf; 17.06.10).

Stovin, V., A. Swan and S. Moore (2007) *Retrofit SUDS for Urban Water Quality Enhancement* (WWW), Sheffield: University of Sheffield. (http://retrofit-suds.group.shef.ac.uk/downloads/EA&BOCF%20Retrofit%20SUDS%20Final%20Report.pdf; 17.06.10).

United Nations Departments for Economic and Social Affairs (UN DESA) (1992) *Agenda 21*, New York: United Nations Division for Sustainable Development.

Water21 Limited is a not-for-profit company limited by guarantee

Registered Office
135 Aztec West
Bristol BS32 4UB
Registered No. 9098337 in England & Wales

http://www.water21.org.uk/contact