North West Regional Spatial Strategy
Regional Flood Risk Appraisal
(October 2008)

CONTENTS

4NW is the new Regional Leaders Forum for the Northwest of England.

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Our board has council leaders from Cumbria, Cheshire, Lancashire, Merseyside and Manchester, plus seven representatives from the private, non-governmental sector. They work together, advised by 4NW staff, to shape government thinking and spending decisions for the Northwest.

1. Introduction

1.1 Flooding is a process that occurs from a number of sources including rivers and coastal waters, groundwater, and surface water drainage. Flooding has major effects on the natural environment. Flooding does threaten lives and can cause substantial damage to property. The effects of flooding events can be increased due to a consequence of previous decisions about the location, design and nature of land use, and as a potential consequence of climate change. Although flooding cannot be totally prevented, the impacts can be avoided and reduced through good planning and flood management.

1.2 Good planning has an important role in helping deliver sustainable development and applying the Government's policy on flood risk management. Planning should aim to reduce and manage flooding by taking flood risk into consideration when making decisions on plans and proposals. Present and future flood risk should be considered, involving both the statistical probability of a flood occurring and the scale of its potential consequences, whether inland or on the coast. Attention should also be made to the wider implications for flood risk on development located outside flood risk areas.

1.3 The Regional Flood Risk Appraisal (RFRA) for the North West Regional Spatial Strategy (RSS) follows the guidance set out in Planning Policy Statement 25 – PPS25 (November 2006) and the attendant practice companion guide, Development and Flood Risk (June 2008). PPS25 states that;

> "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."

1.4 The key planning objectives set out in PPS25 note the need for planning strategies that:

- appraise risk, including the production of a RFRA to inform sustainability appraisal;
- manage risk to ensure development is located to avoid flood risk where possible and manage residual risk;
- reduce risk through safeguarding land that is required for flood management purposes and encouraging appropriate design solutions including sustainable drainage systems (SUDS); and
- encourage partnership working with the Environment Agency and other bodies.

1.5 The timing of the revised guidance set out in PPS25 (November 2006) including the draft guidance (December 2005) prevented the consideration of an RFRA within

the sustainability appraisal of the submitted draft RSS (submitted to Government in January 2006). However, the information contained in this RFRA, along with updated knowledge provided by Catchment Flood Management Plans and Strategic Flood Risk Assessments, will provide a useful input to future rounds of sustainability appraisal of RSS.

1.6 The companion guide to PPS25 sets out what is broadly expected of RSS:

> "A Regional Spatial Strategy (RSS) should aim to provide strategic policies for a region that are compatible with the requirements of PPS25. The policies for each RSS should recognise the flood risk issues unique to that region. Revisions to RSS should be consistent with Strategic Flood Risk Assessments (SFRAs), emerging Catchment Flood Management Plans (CFMPs), Shoreline Management Plans (SMPs) and (when available) River Basin Management Plans (RBMPs), which will be prepared in accordance with the Water Framework Directive."

1.7 The companion guide goes on to note the scope and expected outputs for a RFRA. The guide is written from the perspective of developing a RFRA from the outset of preparing a RSS, which has not been the case for this RFRA for reasons noted in paragraph 1.5 above. The guide sets out the various types of flooding to be considered in the RFRA including coastal and fluvial, sewer, surface water drainage systems and the impact of climate change. As a result of analysing the various flood risks, the guide notes,

> "…it should be possible to identify whether existing flood risk is a significant issue in different parts of the region and:
>
> - where in the region the problem of flood risk is likely to be the greatest;
> - how much of the region is protected by flood defences;
> - where limitations on the amount of development might apply;
> - whether new development in the region is likely to add to that risk; and, therefore,
> - whether flood risk needs to be considered in more detail, for example at sub-regional level, or whether the RFRA can provide the necessary evidence base for the Sustainability Appraisal and preparation of the RSS."

1.8 The recent published review[1] of the floods that took place in the summer of 2007 highlighted a number of conclusions and recommendations that are pertinent to spatial planning including:

- the need for better understanding and information on sources of flooding at the national and regional level;
- a presumption against building in high risk flood areas in accordance with PPS25 including giving consideration to all sources of flood risk, and ensuring that developers make a full contribution to the costs both of building and maintaining any necessary defences;

[1] The Pitt Review – Learning Lessons from the 2007 Floods (June 2008)

- The operation and effectiveness of PPS25 and the Environment Agency's powers to challenge development should be kept under review and strengthened if and when necessary;
- Local authorities should collate and map the main flood risk management and drainage assets (over and underground), including a record of their ownership and condition;
- All relevant organisations should have a duty to share information and cooperate with local authorities and the Environment Agency to facilitate the management of flood risk; and
- Local Surface Water Management Plans, as set out under PPS25 and coordinated by local authorities, should provide the basis for managing all local flood risk.

1.9 Over the coming decades, climate change will contribute 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. This is why it is critical that flooding is taken into consideration when approving plans and developments within the region. The region already has in place a Climate Change Action Plan[2], which includes actions to manage flood risk.

[2] Rising to the Challenge – A Climate Change Action Plan for England's Northwest 2007-09

2. Policy Framework for Flood Risk in the North West

2.1 The North West contains 14 river catchment areas. The river catchments are the Mersey Estuary, Upper Mersey, Derwent, Ribble, Dee, Irwell, Lune, South West Lakes, Eden, Kent/Leven, Wyre, Alt/Crossens, Douglas, and the Weaver/Gowy. Significant work has been undertaken in the region to develop the policy framework to manage current flood risk and plan future development in a manner that accounts for potential flooding. The following sections deal with the main aspects from a spatial planning view including Catchment Flood Management Plans, Shoreline Management Plans, and the policies contained in the draft Regional Spatial Strategy.

Catchment Flood Management Plan

2.2 Catchment Flood Management Plans (CFMPs) enable a strategic, proactive and risk based approach to flood risk management to be taken forward across England and Wales. The development of CFMPs and Shoreline Management Plans (SMPs – see below) will enable the Environment Agency to plan and deliver flood risk management in a way to maximise the opportunities to achieve wider benefits such as the environmental objectives for river basin districts within River Basin Management Plans (RBMPs) under the European Water Framework Directive (WFD). The European Commission has very recently proposed a new Directive on the assessment and management of floods (the Floods Directive) with the aim of reducing and managing flood-related risks to human health, the environment, and economic assets. The RBMPs will therefore sit alongside the flood risk management plans required under the Floods Directive. It is expected that by linking into, but not constrained by, the timetable for the WFD the Environment Agency will be able to move towards better and more integrated water planning at the river basin scale. CFMPs involve a process of flood risk assessment to identify the size and location of various influences that contribute to flood risk in the catchment. In gaining this understanding the Environment Agency are able to determine the effect of potential changes in the catchment on flood risk, select preferred long term policies for each policy unit and recommend actions for implementation in the catchment. The actions arising from the CFMP are assigned to various organisations as the lead to investigate and take forward. The Environment Agency will then co-ordinate and monitor the implementation of the CFMPs.

2.3 The Environment Agency is nearing completion of CFMPs in the North West (and across the rest of England and Wales). These plans set current and future direction so that flood risk is managed in a sustainable and affordable way, despite major challenges such as the increased risk likely from climate change.

2.4 Each catchment is divided up so that a single policy (see list below) can be applied to the individual areas within it. Whilst these policies set the general direction for an area, some policies can be implemented in a variety of ways, so detailed Action Plans within each CFMP reinforce how the policy translates into practice.

2.5 The six generic CFMP policies are:

P1 No active intervention (including flood warning and maintenance). Continue to monitor and advise.

P2 Reduce existing flood risk management actions (accepting that flood risk will increase over time).

P3 Continue with existing or alternative actions to manage flood risk at the current level (accepting that flood risk will increase from this baseline).

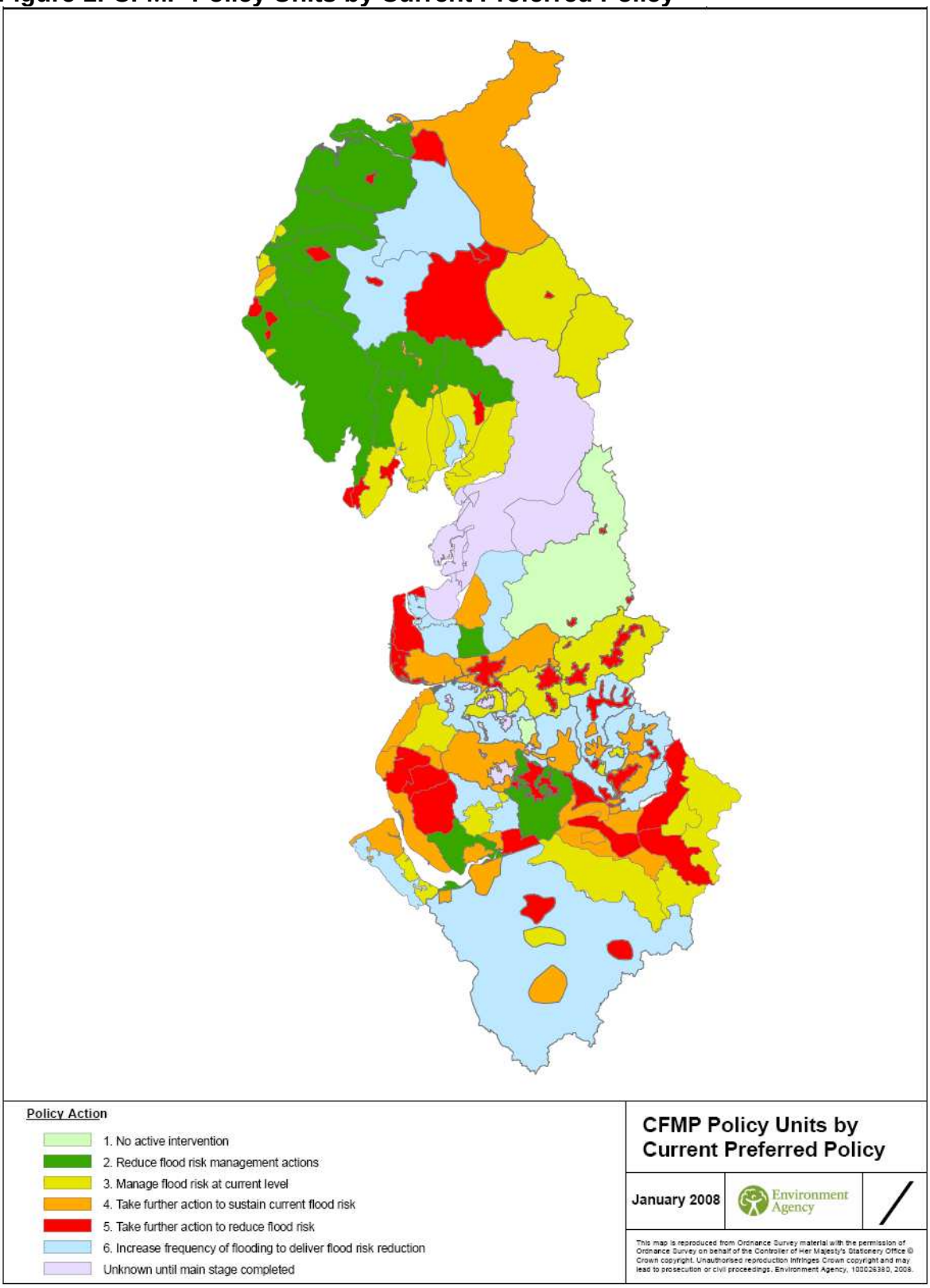
P4 Take further action to sustain the current level of flood risk into the future (responding to the potential increase in risk from urban development, land use change and climate change).

P5 Take further action to reduce flood risk.

P6 Take action to increase the frequency of flooding to deliver benefits locally or elsewhere (which may constitute an overall flood risk reduction, for example habitat inundation).

2.6 Figure 1 shows all of the 'policy units' within North West river catchments, together with the numbered policies chosen. Most policy choices are currently draft - the programme of CFMP work does not finish until December 2008, so policies and actions are not yet defined for all policy units. Environment Agency staff can, however, advise on likely CFMP outputs where plans are not yet complete.

Figure 1: CFMP Policy Units by Current Preferred Policy[3]



[3] The CFMP policy options shown in Figure 1 are still under consideration and may change. It is important, therefore, that they are considered to be indicative only at this stage. If further information is required for a particular local authority area, the appropriate Environment Agency office should be contacted. An electronic version of the map will be available which may be useful for viewing at larger scales (e.g. to overlay local authority boundaries).

2.7 The policies with the greater implications for future development are Policies 3, 4 and 5. Local authorities should refer to Figure 1 to gain an insight into where current and/or future flood risk has implications for development, but to properly understand how this might be managed it will be necessary to refer to Action Plans in the relevant individual CFMPs (or draft outputs). These are available from Environment Agency offices[4].

To explain the policies further:

P1 - means 'do nothing', not even flood warning, so applies only to rural areas with little or no property.

P2 - reduces existing actions, but does allow for minimal river maintenance and activities such as flood warning. In addition, in the unlikely event that properties were to be at increased risk from this policy choice, options such as increasing the flood resilience of those properties would probably be considered.

P3 - is about doing broadly the same amount of work that the Environment Agency and other stakeholders do now, but allows it to be done differently if appropriate. This policy is used in cases where flood risk is considered to be acceptable at the moment and isn't expected to rise much as a result of climate change or catchment-wide development (note that development always has potential to cause localised problems). P3 is likely to involve river and sewer maintenance, flood warning, emergency planning, development control, flood resilience, sustainable drainage systems and maybe land management change such as tree planting or blocking drains on high moorland areas. This policy does not aim for significant reduction in flood risk compared to the current level.

P4 - requires further action than now in order to offset the increase in risk (flood extent, depth and frequency) which would occur due to climate change and development. As for P3, current flood risk is judged to be acceptable, but with P4 it is expected to rise over time if further action is not taken. The same actions as P3 are appropriate, but it may also be necessary to build/raise/ improve some flood defences, provide artificial flood storage or embank around some natural floodplains or create wetlands, over-design sustainable drainage systems, increase sewer capacity, do more or different river maintenance and incorporate further safeguards in planning for any development in floodplain, such as incorporating overland flood flow routes.

P5 - is for locations where flood risk is too high now and this policy aims to reduce it. Actions will be as for P4, but the emphasis is on reducing risk from current levels, rather than merely mitigating for future increases in risk. The flood risk from rivers in urban areas can be reduced by building/raising/improving defences, alternatively this can be achieved by making properties more flood resilient, or expanding the flood warning service, or by removing some

[4] For further details see http://www.environment-agency.gov.uk/regions/northwest/1072087/?lang=_e

properties from the floodplain. Regeneration opportunities have the potential, over time, to bring about the demolition of existing properties in the floodplain and provide wider and more natural river corridors and then to promote building in areas with less risk of flooding. *It should not be taken for granted that P5 means 'build flood defences', nor should it be assumed that new development is made easier in the vicinity of new or improved defences.*

P6 - is different from P1 to P5. Whilst P6 can include other measures, its focus is on achieving environmental benefits by making an area wetter.

Rivers and catchment areas

2.8 The following river catchments have been defined in the region:

River Derwent The River Derwent catchment in Cumbria includes the towns of Cockermouth, Keswick, Workington, Wigton, Silloth, Maryport and Aspatria.

River Irwell The River Irwell catchment including the rivers Roch, Croal, Beal, Irk, Tonge and Medlock. The catchment includes a number of large settlements such as Manchester City Centre, North Manchester, Bolton, Bury, Rochdale, Ramsbottom, Rawtenstall and Littleborough.

River Lune The River Lune catchment includes the towns of Morecombe, Lancaster, Kirkby Lonsdale, and Sedburgh.

Mersey Estuary The Mersey Estuary from Ellesmere Port to Hoylake, including Birkenhead and Warrington.

South West Lakes: The catchment includes a number of rivers flowing off the Cumbrian fells, through south and west Cumbria, to the sea. These include the River Ehen, Esk, Irt, Mite, Annas and Duddon. The main towns are Whitehaven and Barrow-in-Furnesss.

Wyre: The River Wyre Catchment includes the towns of Garstang, St Michaels, Thornton and Fleetwood.

Ribble: The River Ribble including its tributaries the Rivers Hodder, Calder, Darwen and Pendle Water. Principle towns include Preston, Blackburn, Burnley, Colne, Nelson and Accrington.

Kent/Leven: The catchment includes the south Cumbrian rivers of the Crake, Kent, Leven, Mint and Sprint. Towns include Ulverston, Kendal, Ambleside and Windermere.

Douglas: The catchment includes the River Douglas, Towd, Lostock and Yarrow. The main towns include the north of Wigan, Chorley and Leyland.

Alt/Crossens: The Rivers Alt and Crossens Catchment is in south west Lancashire. Towns include Southport, Formby, Ormskirk and the northern suburbs of Liverpool.

Eden: The River Eden catchment includes the Rivers Calder, Petteril, Irthing, Eamont and Lowther. Principle towns include Carlisle, Appleby and Penrith.

Upper Mersey: The Upper Mersey includes the principle tributaries of the River Mersey, including the Rivers Tame, Goyt, Etherow, Dean and Bollin plus a number of smaller tributaries in south Manchester including the Sunderland Brook, Chorlton Brook and Micker Brook. There are many large towns, including much of south Manchester, Stockport, Wilmslow, Glossop, Stalybridge and Macclesfield.

Weaver/Gowy: The River Weaver and River Gowy catchments include the River Dane, Crock, Wheelock and Valley Brook. Main towns are Crewe, Northwich, Ellsemere Port, Congleton and Runcorn.

Dee: Environment Agency Wales leads on the River Dee Catchment Flood Management Plan but those parts, which are in England fall within the North West Region. The principle town on the River Dee in England is Chester.

Shoreline Management Plans

2.9 Shoreline Management Plans were developed in the late 1990s to provide a strategic management tool around the coast of England and Wales. The key aims for SMPs[5] are to:

- reduce the threat of flooding and erosion to people and their property; and
- benefit the environment, society and the economy as far as possible, in line with the Government's 'sustainable development principles'.

2.10 Defra's guidance document sets out the objectives for the SMPs as follows:

- set out the risks from flooding and erosion to people and the developed, historic and natural environment within the SMP area;
- identify opportunities to maintain and improve the environment by managing the risks from floods and coastal erosion;
- identify the preferred policies for managing risks from floods and erosion over the next century;
- identify the consequences of putting the preferred policies into practice;
- set out procedures for monitoring how effective these policies are;
- inform others so that future land use, planning and development of the shoreline takes account of the risks and the preferred policies;

[5] Shoreline Management Plans Guidance, Defra (2006)

- discourage inappropriate development in areas where the flood and erosion risks are high; and

- meet international and national nature conservation legislation and aim to achieve the biodiversity objectives.

2.11 The North West coast is covered by five Shoreline Management Plans[6], developed by partnerships of local authorities, Environment Agency, Countryside Council for Wales and English Nature (now Natural England):

- St Bee's Head to the Scottish Borders

- Walney Island to St Bee's Head

- River Wyre to Walney Island

- Formby Point to River Wyre

- Great Orme's Head to Formby Point

2.12 A review of the SMPs is underway and it is anticipated that the new plans will be prepared by 2010.

[6] Brief information on each SMP can be viewed at www.nwcoastline.org.uk

Regional Spatial Strategy

2.13 PPS25 highlights the importance of developing a robust policy framework to account for flood risk. Policy EM5 provides the cornerstone policy in RSS that deals with flood risk and is reproduced below:

Policy EM 5

Integrated Water Management

In achieving integrated water management and delivery of the EU Water Framework Directive, plans and strategies should have regard to River Basin Management Plans, Water Company Asset Management Plans, Catchment Flood Management Plans, and the Regional Flood Risk Appraisal. Local planning authorities and developers should protect the quantity and quality of surface, ground and coastal waters, and manage flood risk, by:

- working with the Water Companies and the Environment Agency when planning the location and phasing of development. Development should be located where there is spare capacity in the existing water supply and waste water treatment, sewer and strategic surface water mains capacity, insofar as this would be consistent with other planning objectives. Where this is not possible development must be phased so that new infrastructure capacity can be provided without environmental harm;
- producing sub-regional or district level strategic flood risk assessments, guided by the Regional Flood Risk Appraisal. Allocations of land for development should comply with the sequential test in PPS25. Departures from this should only be proposed in exceptional cases where suitable land at lower risk of flooding is not available and the benefits of development outweigh the risks from flooding;
- designing appropriate mitigation measures into the scheme, for any development which, exceptionally, must take place in current or future flood risk areas, to ensure it is protected to appropriate standards, provides suitable emergency access under flood conditions, and does not increase the risk of flooding elsewhere;
- requiring new development, including residential, commercial and transport development, to incorporate sustainable drainage systems and water conservation and efficiency measures to the highest contemporary standard;
- encouraging retrofitting of sustainable drainage systems and water efficiency within existing developments;
- raising people's awareness of flood risks (particularly for vulnerable groups) and the impacts of their behaviours and lifestyles on water consumption.

2.14 The RSS also includes other policies that feature specific clauses referring to flood risk issues including DP2 (Promote Sustainable Communities), DP9 (Reduce Emissions and Adapt to Climate Change), EM6 (Managing the North West's Coastline) and MCR1 (Manchester City Region Priorities). Moreover, the supporting text for policies RDF3 (The Coast) and L4 (Regional Housing Provision) provide further explanation on the importance of considering flooding as an issue.

3. Methodology

3.1 A number of information sources were used to inform the analysis presented in this document. The five main aspects covered by the Regional Flood Risk Appraisal are as follows:

- A survey of all local planning authorities in the North West to gauge their broad assessment of flood risk issues including surface water flooding;
- Work undertaken by the Environment Agency to evaluate the potential impact of fluvial and coastal flooding in relation to the proposed housing figures set out in draft RSS;
- An assessment of any potential flood risk implications related to regionally significant economic development;
- An overview of the issues to consider with other aspects of flooding, namely groundwater and sewer flood risk, and
- The potential impacts of climate change.

Local Planning Authority Survey

3.2 The draft companion guide to PPS25 advocates that the RFRA should utilise information from existing flood risk assessments including Strategic Flood Risk Assessments (SFRA). To this end, a short questionnaire (Appendix 1) was circulated in July 2007 to all local planning authorities in the region covering the following matters:

- To gauge in very broad terms, views on the significance of flood risk as a factor in strategic planning in each area;
- To provide a snapshot of the state of coverage achieved with SFRA within the region;
- To obtain information on surface water flooding issues considered to be of regional significance.

The results from the survey are set out in Section 4.

Flood Risk Rankings – Environment Agency

3.3 An assessment of the potential risk from fluvial and coastal flooding was undertaken by the Environment Agency utilising the housing allocations set out in the submitted draft RSS (January 2006). The assessment was based on existing flood risk data held by the Agency, which was combined with information on future housing development contained in the draft RSS. The resultant calculation set out a ranking of local planning authorities (excluding the three shire counties) in the region in terms of the relative potential relationship between flood risk and housing development.

The information has been updated to reflect the recommendations on housing allocations and previously developed land targets set out in the Proposed Changes (March 2008), and the release of new Land Use Change Statistics issued by DCLG in October 2007.

3.4 Section 4 contains a summary of the overall ranking generated as a result of the Environment Agency's work. Appendix 2 contains the full set of tables produced by the Environment Agency which in turn show:

Table 1 LPAs ranked by number of existing properties in Flood Zone 3

Table 2 LPAs ranked by the average number of properties at risk of flooding per year

Table 3 LPAs ranked by housing allocation including housing densities and taking into account brownfield land development targets

Table 4 LPAs ranked using brownfield development area required in existing urban area but outside Flood Zone 3

Table 5 LPAs ranked by current flood risk and future development pressure (. combining outputs from Tables 2 & 4)

3.5 Table 1 shows the total number of properties in both Flood Zones 3 and 2 for each Local Authority. Whilst this shows where the greatest developed areas sit within the floodplain, it provides no indication of the likelihood of flooding in these areas in terms of the height of properties above river level or the protection afforded by flood defences.

3.6 Table 2 shows the number of properties in each Local Authority which, on average, could be expected to flood each year. This is the number of properties in each flood 'cell' divided by the standard of protection for that flood cell. For example, if 5,000 properties all have a 1 in 100 year standard of protection, the number which would be expected to flood each year would average 50. There could be many years with no floods at all and some years with anything up to 5,000 flooding. The figures presented are totals within each local authority area for a number of flood cells, each of which may have different standards of protection. This table includes all flood risk up to and including 1 in 1,000 years (Flood Zones 2 and 3). In densely urban areas the numbers of properties at flood risk may be slightly over-stated as the data includes all addresses in multi-storey buildings, not just those on the ground floor. Local Authorities have been categorised as 'high', 'medium' or 'low' and scored 3, 2 or 1 accordingly.
[The data used in this table differs from that used for the Agency's current Flood Map (Table 1), but is the best data available for standard of protection against flooding. Tables 1 & 2 are, therefore, not directly comparable, but the data in each is the most reliable for ranking purposes.]

3.7 Table 3 shows the housing allocations and brownfield development targets extracted from the Proposed Changes. Information was also obtained on the average

housing density figures[1] for each local planning authority. The potential area of brownfield development required in each local planning authority was then calculated. This was compared to the existing urban area outside Flood Zone 3, to identify potential difficulties in accommodating proposed development outside higher risk floodplain areas. Monitoring future development densities will be important to see if higher densities will help to relieve pressure to develop in floodplain. Conversely, lower densities may increase the challenge of accommodating development outside Flood Zones 3 and 2.

3.8 Table 4 presents, for each local authority area, urban areas both inside and outside Flood Zone 3 along with the areas of brownfield development required. LPAs are ranked from 5 (high) to 1 (low) according to brownfield development space required/space available. Greenfield development has been ignored for the purposes of this assessment as there is less planning emphasis on greenfield development and more of such land is available outside floodplain.

3.9 Table 5 combines the rankings in Tables 2 & 4 to present the overall ranking for each local authority. The tables produced to support the RFRA cover only those parts of each local authority within the Agency's North West Region boundary. For completeness, further work would be required to include a small number of additional properties in the Earby area of Pendle and larger numbers of properties around Chester City, the latter being the only area where some further data is required.

3.10 The Tables have a number of limitations. First, no table represents a single 'Flood Risk League Table' for North West local authorities. Flood risk is complex and any assessment of flood risk needs to consider outputs from all of the accompanying Tables. The position of each authority in each of the Tables should be considered and the reasons for this position understood. Understanding these tables, and their limitations, will help to give individual local authorities an indication of the type and scale of the flood risk management challenge they may face. For example:

- A high position in Table 1 denotes large numbers of properties in Flood Zone 3 (but no indication as to whether some or all of these are at risk every 10 years, 50 years, or 100 years)
- A high position in Table 2 denotes high current flood risk (either large numbers, or low standard of protection, or both)
- A high position in Tables 3 & 4 denotes development pressure and the potential for each local authority to possibly accommodate development in urban areas outside flood risk areas, but without any other planning constraints taken into account.
- A high position in Table 5 denotes potentially high current and future flood risk. This is due to a combination of the numbers of existing properties in floodplain, the standard of defences, the level of proposed future housing allocations and brownfield land available for residential development assumed to take place within existing urban areas, but outside Flood Zone 3.

[1] Land Use Change in England to 2006: Additional Tables LUCS-22A, DCLG (October 2007)

Regionally Significant Economic Development

3.11 The consideration of flood risk associated with regionally significant economic development initially focused on Policy W2 in the submitted draft RSS. A briefing paper was produced for the Examination in Public illustrating the relationship between the broad locations and flood risk zones 2 and 3.

3.12 Another aspect that can be considered is the relationship between flood risk and the strategic regional sites included in the current Regional Economic Strategy. The Environment Agency has carried out an initial evaluation of potential flood risk issues associated with the specific sites.

Overview of other flood risk sources

3.13 Information has been gathered on other potential flood risk sources including groundwater and sewer flood risk. This report provides a brief overview of key issues to be considered in the region. A section has also been included on climate change detailing issues that are likely to need to be addressed and the sea level rises and peak river flows anticipated in the latest research.

4. Analysis of Flood Risk

Local Planning Authority Survey

4.1 The questionnaire distributed to the 44 local planning authorities in the region that will produce Strategic Flood Risk Appraisals, or in some cases, have already done so, drew a response from 22 individual authorities. A response on behalf of the 10 Greater Manchester authorities was also received.

4.2 Six of the authorities that responded had, as of July 2007, completed a Strategic Flood Risk Assessment (SFRA). A further 12 were undertaking their SFRA whilst the remaining four were at the planning stage. A further response on behalf of the ten Greater Manchester authorities noted that they were at an early stage in developing a joint approach to SFRA.

4.3 About one third of the authorities had either undertaken or were considering that there would be a requirement to undertake an SFRA that included the increased scope set out in PPS25 (paragraph E6), which states:

> "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."

4.4 Authorities' views about the significance placed upon flood risk as a factor in strategic planning within each area were sought to provide a simple benchmark comparison against the flood risk rankings work undertaken by the Environment Agency. It was also seeking a very simplified view from the local authorities as to how important they individually viewed flood risk as an issue. The results from the responding authorities are set out in the table below.

Table 1: Local Authorities' response to the question – "How significant do you consider flood risk to be as a factor in strategic planning in your district?"

Very Significant					Not Significant at all
7	4	8	3	0	

4.5 Whilst the response from the survey means that only a partial analysis can be applied, it is instructive to note that there are some differences between the assessment of the significance of flood risk received in the questionnaire response, and the flood risk rankings analysis set out in section 4.2 of this report. Three of the eight authorities that identified the issue as 'very significant' in their questionnaire

response fall within the lower third of the flood risk rankings (Table 5, Appendix 2). In contrast one of the three authorities that considered the issue was of relatively lower significance features in the upper third of the flood risk rankings. The analysis tentatively points to the need for further consideration of how a flood risk rankings exercise undertaken for this Regional Flood Risk Appraisal needs to be combined with views from local planning authorities and the information they have developed for Strategic Flood Risk Assessments in order to better understand the strategic implications for flood risk management across the region.

4.6 The second part of the questionnaire asked for views on surface water flooding. Around two thirds of the authorities considered that they had experienced surface water flooding associated with drainage systems. Authorities made a couple of key points with regard to this issue:

- The information, where it is available, provides a historical perspective of this aspect of flooding and therefore gives no indication of potential future flooding problems; and
- A number of organisations including utility companies, highways authorities, the Environment Agency and in some instances district councils hold information. It is not clear the level of coordination that exists between bodies to ensure that all the relevant information can be assembled to give a clear picture of flood risk from all sources, particularly in the case of SFRAs.

4.7 The issues noted above are picked up in the Pitt review[7]:

> "Surface water flooding is complex and affected by many factors, such as the capacity of the sewerage/drainage system, saturated ground and high river levels that prevent the system from discharging. The responsibilities for certain drainage assets remain unclear, a situation that frustrated the public during the summer 2007 floods. This lack of transparency in ownership and the complexity involved could be reduced by having a single national organisation with an overarching responsibility for all types of flooding. That is why we believe that government leadership should be supported by clear oversight of all flood risk management activity and the Environment Agency's risk management responsibilities extended accordingly."

Flood Risk Rankings – Environment Agency

4.8 Appendix 2 contains the tables that set out the various assessments undertaken by the Environment Agency. Figure 2 illustrates the information set out in Table 5 of Appendix 2. The local planning authorities at the top of Table 5 would appear to have existing high levels of flood risk, high development pressure and possible problems accommodating development on low risk sites. These authorities should view the production of a detailed SFRA to inform their sequential test and LDF processes as a matter of urgency and include more detail within their assessment.

[7] The Pitt Review – Learning Lessons from the 2007 Floods (June 2008)

4.9 In some cases, there may be significant land available outside Flood Zone 3 (but possibly in Zone 2). In these instances, required levels of development might be achievable but must be in accordance with the approach set out in PPS 25. In this event, a local planning authority will appear lower down Tables 3, 4 and 5 than it may do in Tables 1 & 2. Whilst this would suggest a lower flood risk management issue, especially in terms of planning for growth, authorities in this position cannot afford to be complacent. This lower position assumes that development can and will be accommodated in Flood Zone 1 and 2, rather than in Zone 3, possibly outside the existing urban area. Carlisle City Council is an example. It is inside the top third of Tables 1 and 2, denoting high existing flood risk, but drops below the middle of other tables. This is because it has plenty of urban and rural land outside Flood Zone 3 and modest housing allocation and brownfield development targets. However, development in and around Carlisle City is likely to be focussed in existing urban areas in, or near to, high and moderate flood risk areas, so careful planning will be essential.

4.10 It should also be noted that the assessment concentrates on Flood Zone 3, but Flood Zone 2 is not without risk. Local authorities such as Wirral appear to have a low ranking, but large numbers of properties are located behind sea defences, which are built to high standards. The risk of failure of any defence can never be ruled out and so a Strategic Flood Risk Assessment is still a priority.

4.11 The data contained in the tables will assist in:

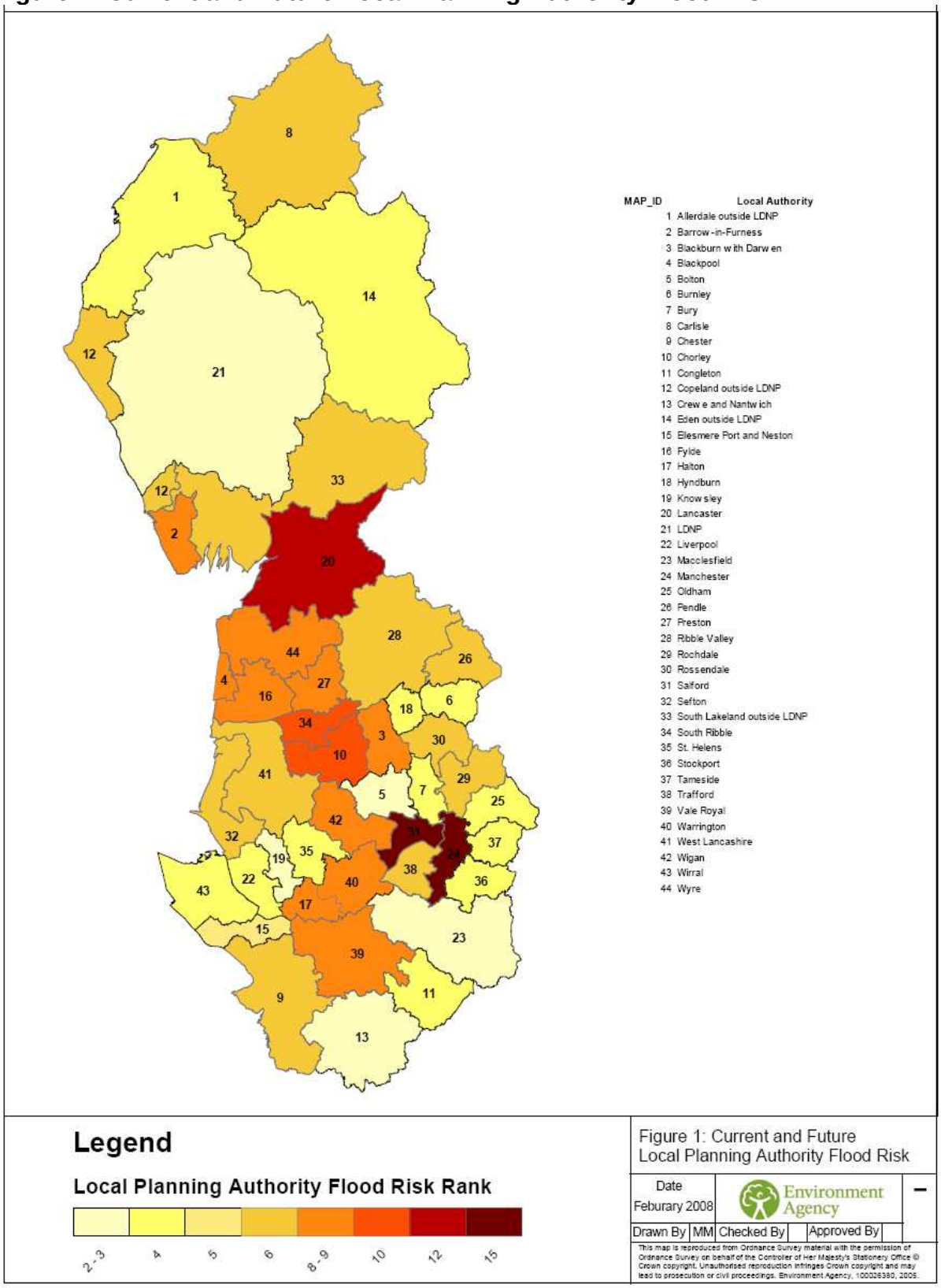
- Supporting local planning authorities in the preparation of Strategic Flood Risk Appraisals;

- Considering whether all development can be accommodated on brownfield land outside Flood Zone 3 (and, ideally, outside Flood Zone 2);

- Considering the flood risk implications for development on greenfield sites as these have not been considered in the current tables in Appendix 2. In this regard PPS 25 should be applied.

- Providing options to manage flood risk including making space for water and determining what an acceptable level of risk is, and seeking to reduce risks through designing flood resilient buildings and incorporating Sustainable Drainage Systems.

Figure 2: Current and Future Local Planning Authority Flood Risk



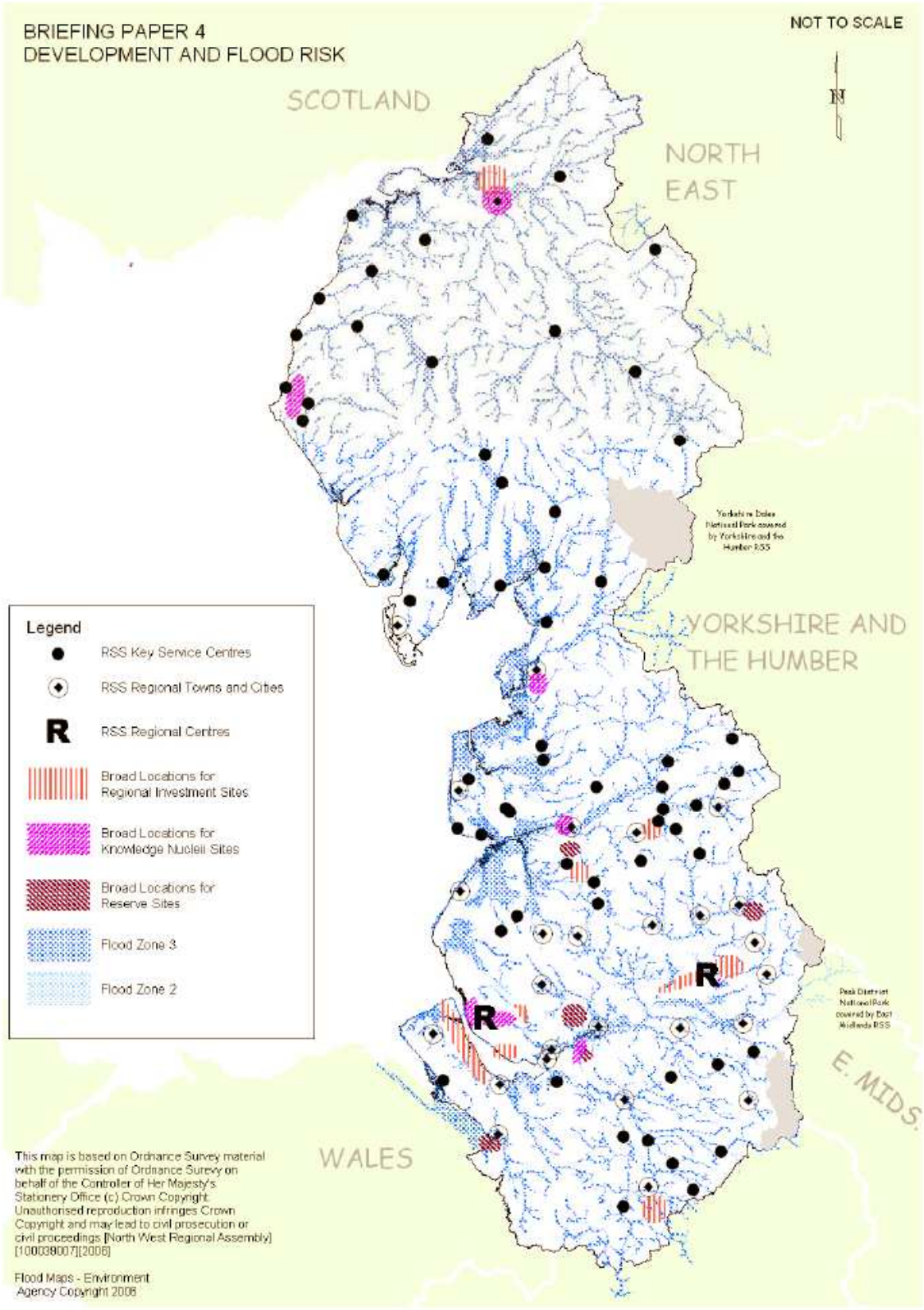
4.12 The number of households at risk of flooding is unlikely to fall in the medium to long term. This creates a greater need for spatial planning to adopt innovative solutions to reduce the consequences of flood risk. The analysis of the tables in Appendix 2 attempts to show the distribution of **current** and **future** flood risk across Local Planning Authorities in the North West Region. Where authorities score highly in Table 5, it suggests that they have high current and future flood risk and may have a particular challenge in accommodating new development with little or no increase in residual flood risk, particularly when other planning constraints are built in. These authorities, as a matter of urgency, supported by the Regional Assembly, Regional Flood Risk Assessment and the Environment Agency, should produce detailed Strategic Flood Risk Assessments to assist them in the application of the Sequential Test to development allocations, as required in PPG/PPS 25. Where a local authority appears in the **upper third** of any of Tables 1 to 5 it too should still view the production of a detailed SFRA as a high priority. It should also be emphasised that **all** local authorities should produce an SFRA and appearance lower down the tables do not imply that flood risk is not an issue for these local authorities.

4.13 The Environment Agency has provided advice and data to the Regional Assembly to assist in the development of the Regional Flood Risk Assessment. Moreover, it has advised local authorities in the production of their Strategic Flood Risk Assessments. Ongoing Catchment Flood Management Plan (CFMP) work is an important input and advice from the Environment Agency's Area Planning Liaison and Development Control staff will be essential.

Regionally Significant Economic Development

4.14 The submitted draft RSS identified a number of broad locations for regionally strategic economic development (Policy W2). As part of the briefing material produced for the examination in public, the Assembly produced a map that illustrated the relationship between the broad locations in the draft RSS and flood zones two and three (Figure 3).

Figure 3: Development and Flood Risk (Briefing Paper 4, RSS Examination in Public – October 2006)



4.15 The Panel Report (March 2007) recommended that policy W2 was revised to form a criteria based approach, taking account of the principles in policies DP1 to DP8 (new policies drafted by the Panel) and amended policy RDF1. An additional policy was also suggested by the Panel to set out the broad locations for potential inter-modal freight terminals (policy W2A) based on the broad locations for such uses contained in policy W2 of the draft RSS. These recommendations were carried through into the Proposed Changes (March 2008) and ultimately the final published RSS (September 2008) with a redrafted policy W2 that adopted a criteria based approach to regionally significant economic development, whilst a new policy RT8 incorporated the inter-modal freight terminals. The assessment of flood risk related to regionally significant economic development is therefore harder to achieve, albeit the broad locations for inter-modal sites can still be illustrated. The pragmatic step suggested by the Assembly is to utilise the strategic regional sites set out in the current Regional Economic Strategy as a means of analysing the potential impact of flooding on regionally significant economic development locations/sites.

4.16 The Northwest Regional Development Agency (NWDA) is responsible for producing the Regional Economic Strategy (RES). The current RES includes a number of transformational actions which are considered to be fundamental to achieving the six transformational outcomes set out in the RES. Action number 80 sets out the need to:

> *'Deliver the designated Strategic Regional Sites as regional investment sites, knowledge nuclei or intermodal freight terminals.'*

4.17 The Environment Agency, in its role as a statutory consultee, has provided comments on various planning applications and masterplan exercises undertaken for individual strategic regional sites. A brief analysis was undertaken by the Environment Agency of the comments supplied by their area offices. In general, most of the comments related to the need to incorporate drainage schemes including Sustainable Drainage Systems within the various schemes proposed. A few instances highlighted known flood risk problems associated either with a site or potential flood risk problems that could be exacerbated without sufficient mitigation measures being put in place on a site.

Overview of other flood risk sources

Groundwater Flooding

4.18 Groundwater flooding is defined as the type of flooding that can be caused by the emergence of water originating from underground. The water may emerge from either point or diffuse locations. The occurrence of groundwater flooding is local. Unlike flooding from rivers and the sea, groundwater flooding does not pose a significant risk to life, but is more associated with significant damage to property, with flooding persisting over a number of weeks for some types of groundwater flooding. Groundwater flooding is a significant but localised issue that has attracted an increasing amount of public concern in recent years.

4.19 Groundwater flooding arises from:

- Natural exceptional rises in groundwater level, reactivating springs and short lived watercourses (often referred to as ‘clearwater’ flooding);
- Rising groundwater (rebound) following reductions in historic abstraction;
- Minewater recovering to natural levels following cessation of pumping; and
- Local shallow drainage/flooding problems unrelated to deep groundwater responses.

4.20 Groundwater flooding is sporadic in time and location, but when it occurs it usually lasts longer than surface water flooding and interferes with property and infrastructure (such as roads). In most cases groundwater flooding cannot be managed or solutions engineered.

4.21 There are many other localised and site-specific reasons for water to emerge at the surface or to appear in basements, for example, leaking water mains and sewers, blocked drains, and impedance of natural drainage routes by urban development or deepening of cellars to below the natural water table.

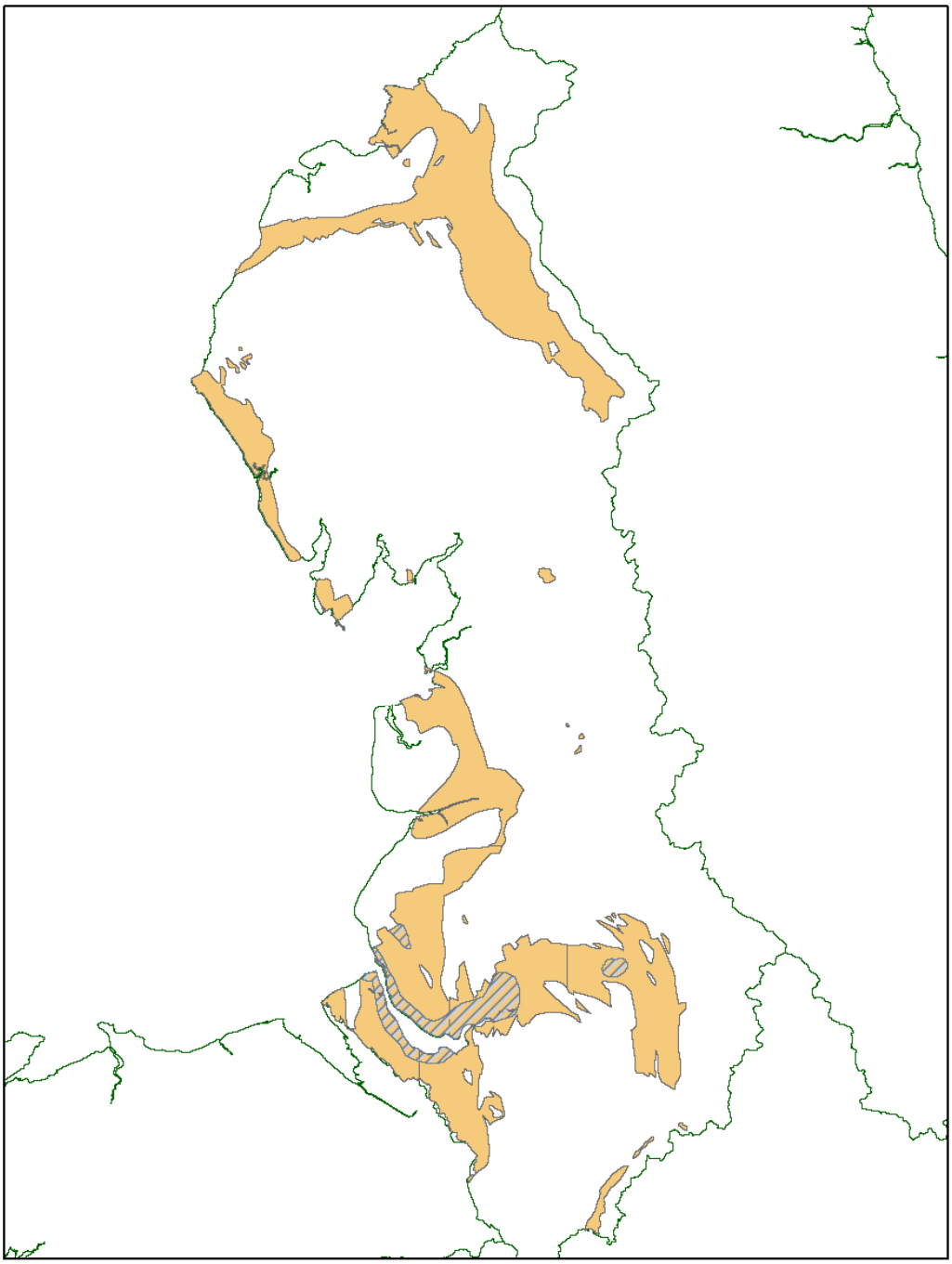
4.22 Figure 4 below shows the location of the Permo-Triassic Sandstone aquifer in the North West and areas which could potentially be at risk from rising groundwater levels. The North West is not prone to the widespread ‘groundwater flooding’ that can occur in chalk groundwater catchments in southern England, following prolonged high levels of rainfall and recharge. This is mainly because of the differences in geology across the country. The major bedrock aquifer in the region, the Sherwood Sandstone, is moderately unresponsive to rainfall events, with seasonal groundwater fluctuations typically less then a metre. This is partly because of its high storage characteristics of the sandstone, and also because much of the region is covered by low permeability glacial clays. These tend to isolate the deeper bedrock aquifers from intense rainfall events.

4.23 Groundwater rebound is occurring in some parts of the region as a result of recovery in groundwater levels back to their natural conditions, following cessation or reduction in abstraction. Historic abstraction stresses have been greatest in the sandstone aquifers to the north and south of the Mersey, due to a combination of industrial and public water supply pumping. At worst, groundwater levels will only recover to their natural, pre-pumping conditions. These usually appear as springs and watercourses. The Environment Agency is currently undertaking a groundwater resource investigation in the North Merseyside and Lower Mersey Basin. This will investigate the feasibility of Identification of areas at risk from groundwater rebound.

4.24 The impact of groundwater rebound is only likely to affect development that has taken place since abstraction started and groundwater levels have been depressed. The greatest impact is on subsurface infrastructure such as basements. An example is the Liverpool Loop Line tunnel that was constructed ‘in the dry’ at a time when groundwater levels had been artificially lowered by abstraction in Liverpool city centre. More recent reductions in abstraction has seen rising groundwater levels. This caused increased ingress of groundwater into the unlined sections of the tunnel.

Network Rail has now installed a series of dewatering boreholes around the loop line that are effectively controlling groundwater levels and tunnel inflows. Cessation of mine dewatering following abandonment of the deep coal mines of the Lancashire Coal Field is also resulting in groundwater rebound.

Figure 4 – Potential Groundwater Flooding Locations



Legend

Areas of Permo-Triassic Sandstone Aquifer

Areas potentially at risk from groundwater rebound

Sewer Flooding

4.25 Sewer flooding, as for all forms of flooding, needs to be addressed through PPS25, particularly its requirements for flood risk appraisal at all levels. Sewer flooding occurs as a result of the capacity on the sewer being exceeded. This situation can occur for a number of reasons :

- Overloading - The area now draining to the sewer has increased as a result of new development since the sewer was designed and built

- Exceedance – The volume of water generated by the storm is greater than the sewer was designed for (i.e. sewer designed for 1 in 30 year storm actual storm 1 in 80 year)

4.26 Proposals for increased development, changes to the region's industrial and commercial sectors and even people's water use behaviour can all affect the sewer network and levels of sewer flood risk. There is therefore a risk of sewer flooding in **ALL** sewered areas that PPS25 can help eliminate, reduce or manage. As a result, we need to:

- better understand levels of sewer flood risk and the implications this has for development; and

- better understand the impact that the urban drainage from developments themselves will have on sewers and how this must be managed.

Understanding and addressing sewer flood risk

4.27 United Utilities (UU) currently maintains a register (the DG5 at Risk register). This only reports actual incidences of sewer flooding and does not give an indication of the true levels of risk that exist within the region.

4.28 It is important that this information is fed into the local authority SFRA process, though it is currently UU policy not to release information on individual properties which have experienced flooding. UU will however give the numbers of properties on the register within a postcode area (e.g. WA1 6). This information, when used in isolation could be misleading as UU also has large capital programmes to remove properties from the DG5 register. The register constantly changes and up to date information should always be sought from UU by those carrying out any sort of flood risk assessment.

4.29 UU are currently working to better understand the actual risk of sewer flooding via their hydraulic modelling processes. They are currently running various storm events through their existing sewer models (including an allowance for climate change). The modelling will give details of the actual performance of the sewer drainage system but **NOT** true flood risk. Further work will be needed to model the potential impacts of the identified deficiencies, requiring the application of digital terrain models etc.

Managing the impact of development on sewer capacity

4.30 The sewer network is not intended to be the major part of the urban drainage system and all sewers will flood under certain rainfall conditions. It would be impractical and cost prohibitive for the water industry to increase the capacity of the sewer network to accommodate all flows from rainfall and urban runoff, especially when climate change implications are considered.

4.31 Achieving a more integrated approach to urban drainage is therefore critical to our ability to properly deal with land drainage and flood prevention. Key to this, especially in terms of reducing loads on our drainage infrastructure in light of climate change, and tackling diffuse pollution, will be the increased/mandatory use of SUDS on all developments.

4.32 However, due to the current legislative and funding arrangements, there are multiple organisations with responsibility for aspects of urban drainage. Additionally, despite the use of SUDS being actively promoted in planning policy guidance (and through the code for sustainable homes), there has historically been an issue within the water industry around the adoption and maintenance of SUDS. These present barriers to achieving a more integrated approach to urban drainage and the wider uptake of SUDS.

4.33 In the longer term, we expect these difficulties to be resolved by changes in primary legislation and a simplification of the arrangements and responsibilities for the management of the urban drainage infrastructure.

4.34 However, in moving things forward in the short term, local development frameworks, informed by strategic flood risk appraisals, must provide a stronger policy framework around SUDS and integrated urban drainage. In line with RSS policy EM5, PPS25 and code for sustainable homes, this must include:

- a policy in LDF's requiring **all** new development to include SUDS systems. The principle underlying this policy should be that drainage from **any** development which doesn't incorporate SUDS techniques will not be accepted **unless** the developer can prove that they have considered all possible alternatives (including on-plot controls) and can justify why these are genuinely not appropriate.

- In relation to this, LDF policy should set minimum SUDS requirements. These should include techniques, especially on-plot controls such as green roofs, soakaways etc, that do not require adoption (although will require proper maintenance). However, where there are other material planning or technical considerations which prevent the use of SUDS, these will need to be clearly justified and identified as part of any planning application.

- A wider list of appropriate SUDS techniques to be considered by developers. This list will have to be developed in consultation with the Environment Agency and UU with carefully reference to any performance or technical standards necessary to allow these techniques to discharge to the sewer system.

- Include policy which seeks to encourage green infrastructure or open space to provide a sustainable drainage function where appropriate. This must take

advantage of opportunities where this open space is in public ownership and/or maintained by management companies to overcome current adoption and maintenance issues.

- Consideration if there may be locations where Permitted Development Rights need to be removed where householders wish to pave over front gardens leading to an unacceptable reduction in infiltration and increase in flood risk due to surface water runoff.

Climate Change

4.35 Climate change is the biggest threat to our environment. Scientists agree it is happening and that human activity is increasing it. It is expected that summers will be drier but rainfall will be more intense. Parched soils and hard surfaces caused by new development will be unable to absorb heavy rain fast enough resulting in rapid run off to rivers and drainage systems. This will increase the risk of more localised and severe flooding. Winters are already becoming wetter and more of the rain is falling in heavy downpours. Many rivers already indicate an increase in frequency of peak levels. Heavy rainfall in early January 2005 caused extensive flooding over much of Cumbria and, in particular, Carlisle.

4.36 Global sea levels will rise as a result of melting ice at the poles, melting glaciers and thermal expansion of the oceans as temperatures rise. The recommended contingency allowance for net sea level rise for the North West are as follows:-

Up to 2025 : 2.5mm/year
2025-2055 : 7.0mm/year
2055-2085 : 10.0mm/year
2085-2115 : 13.0mm/year

Summarising these allowances gives:

2057 = 275mm rise
2107 = 841mm rise

4.37 Appendix 2 gives a detailed breakdown by local authority of the predicted rise in water levels across the catchments in the North West.

4.38 Sea level rise has the potential to pose a major challenge for coastal towns and any urban areas on tidally affected watercourses (e.g. Warrington, Lancaster and Preston). There will be a need to promote sustainable development principles in the Regional Spatial Strategy and Local Development Frameworks to adapt and compensate for climate change. Key actions include:

- Maintaining and updating flood risk maps regularly.
- Building new, and maintaining existing, defences where it is possible to do so.
- Designing all new flood defences with climate change in mind (e.g. allowing for a 20% increase in peak river flows).

- Increasing flood storage using specially constructed storage basins, wetlands and natural flood plains.

- The avoidance of inappropriate development in flood risk areas.

- Where development must take place in areas of flood risk, flood resilience measures should be incorporated into buildings and overland flow routes carefully considered.

- Using regeneration opportunities to reduce the numbers of properties in the floodplain areas and provide wider river corridors.

- Extending and improving the flood warning system and coverage where possible and disconnecting some roof drainage from the sewer network.

- Encouraging the use of sustainable drainage systems and bringing about a system of strategic planning of surface water and sewerage systems.

- Developing Catchment Flood Management Plans and Shoreline Management Plans which can be incorporated into the Water Framework Directive River Basin Management Plans to provide climate change impact predictions.

- Reducing flood risk to critical infrastructure such as water treatment works and pumping stations, hospitals, power stations, sub-stations etc.

- Making more use of flood storage in reservoirs and canals.

Next Steps

4.39 This current version of the RFRA will need to be reviewed within the context of developing the Implementation Framework for RSS. 4NW intends to work with the Environment Agency in updating, where appropriate, the flood risk rankings presented in the report. In addition, work on SFRAs has progressed since the survey conducted by the RPB in July 2007, and there are aspects of the information within the SFRAs that would prove useful to incorporate into a revised RFRA.

5. Conclusion

5.1 The Regional Flood Risk Appraisal set out in this document has identified the potential flood risk issues that are of regional significance. The flood risk rankings produced by the Environment Agency provides an innovative approach to understanding flood risk. It is acknowledged that the various tables have a number of limitations. However, taken together, they do provide individual local authorities with an indication of the type and scale of the fluvial and tidal flood risk management challenge they may face. The RFRA therefore assists in the production of Strategic Flood Risk Assessments undertaken by local planning authorities and will underpin the sequential approach to development and flood risk required by PPS25. It also starts to identify some of the other flood risk management issues which LPA's need to understand and address within their spatial planning process. In turn, the detail that will emerge from the SRFAs and LDF's will feed into future versions of the RFRA.

5.2 In doing this, local authorities should particularly:

- Take account of the emerging Catchment Flood Management Plans (CFMP) outputs for their area and integrate these into their SFRA process. This should assist LPAs in understanding the implications of the CFMP policies in relation to spatial options produced in development plan documents. However, actions to reduce risk or offset increases in risk are not just about raising flood defences, and where new or improved defences are required, it should not be taken for granted that development is made easier in these areas. Effective solutions can be achieved by ensuring development and regeneration activities reduce the consequences of flooding without the need for new flood defences.

- Understand the implications of the RFRA flood risk ranking exercise. Local authorities within the top third of table 5 of the flood risk ranking exercise would appear to have high existing levels of flood risk, high levels of development pressure and a greater challenge finding low risk brownfield sites outside of the floodplain to accommodate necessary growth on. It should be emphasised that **all local authorities need to produce a SFRA** and consider flood risk no matter where they appear within the rankings set out in the RFRA.

- A high position in table 5 (appendix 2) should not be taken as an acceptance that development in the floodplain is an inevitable result. It indicates that the challenge to manage flood risk will be greatest in these locations and that it is these authorities where, if anywhere, exceptions test situations may be more common. To a degree, some of these will be where climate change impacts are also expected to be the greatest (appendix 3). To properly address these challenges, it is essential for local planning authorities develop an early and a robust SFRA and a transparent sequential test process is undertaken.

- Understand any flood risk implications of regionally significant economic development locations. The RFRA has concluded that there were flood risk issues relating to the development of some of the strategic regional sites identified within the RES. There is a need to ensure that where there are known

flood risk problems associated with these existing sites or where development itself could exacerbate potential problems, sufficient mitigation measures will be necessary.

- Ensure SFRA's and spatial plans take proper account of other forms of flooding and climate change. Where local authorities contain areas identified as having potential for groundwater rebound (Figure 3), groundwater flood risk should be specifically identified as an issue for consideration within the SFRA.

- When considering the issue of sewer flood risk, early contact with United Utilities (UU) as part of the SFRA process is essential. There must also be early dialogue between LPAs and UU around their site allocation process to ensure it can be informed by any issues of sewer network capacity. There will need to be a much stronger policy framework within LDF's requiring SUDS to ensure capacity is maximised in the surface water drainage network and to make it more robust in light of the challenges of climate change. Developments **not** incorporating SUDS should **not** be acceptable unless other material planning or technical considerations which prevent their use can be clearly identified as part of any planning application.

- When taking account of climate change, a starting point for SFRA's is the changes in level at the various key settlements as shown in appendix 3 of the RFRA. Similarly, for those LPAs affected by tidal flood risk, the contingency allowance for net sea level rise in the North West (as set out in paragraph 4.36 of the RFRA) should be the starting point for consideration in SFRA's.

- Take opportunities to use the spatial planning system to reduce flood risk. In this regard, planning for development and regeneration should attempt to: increase flood storage and attenuation, particularly including it within wider green infrastructure; use careful site layout to reduce the number of properties within floodplain areas and widen river corridors; increasing the use of SUDS and disconnecting some roof drainage from the sewer network; and taking opportunities to reduce flood risk to critical infrastructure, either through relocation or increasing resilience/resistance to flooding.