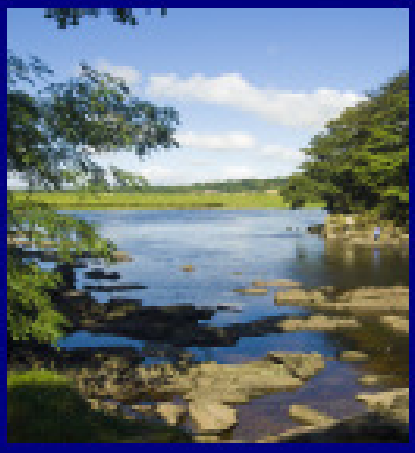
Ribble Valley Borough Council

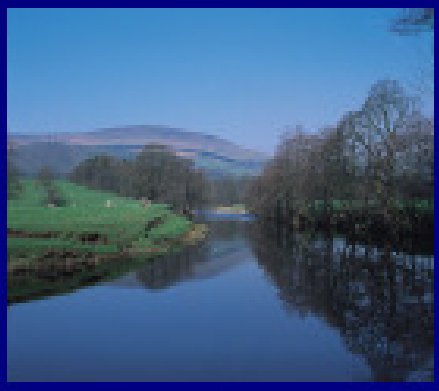
Strategic Flood Risk Assessment

-Level One-

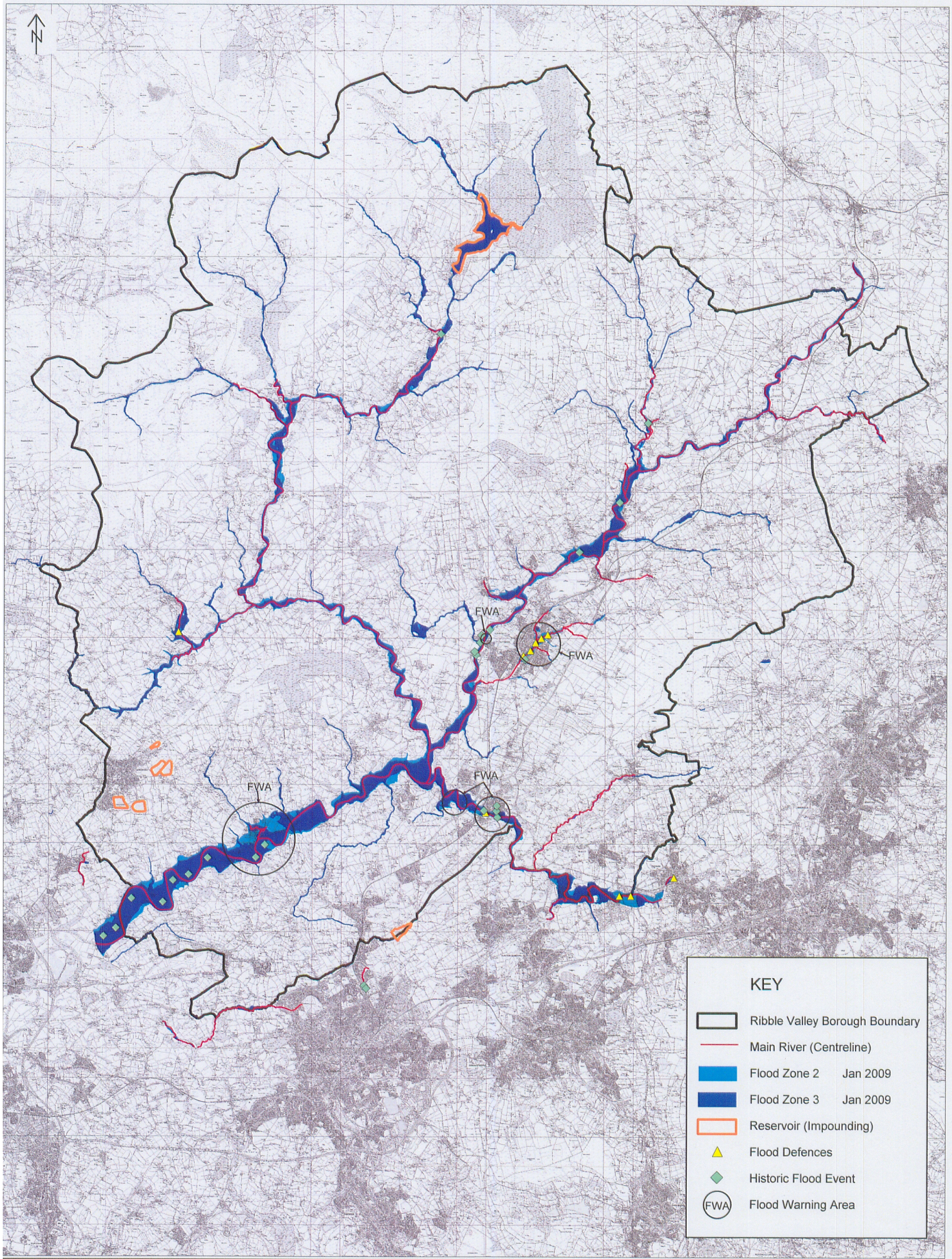
ADOPTION REPORT

MAY 2010





RibbleValley
Local Development Framework



MAP 1 RIBBLE VALLEY STRATEGIC FLOOD RISK ASSESSMENT

Scale: 1:115000

RIBBLE VALLEY LEVEL 1 STRATEGIC FLOOD RISK ASSESSMENT

Brief Summary

Local planning policy for Ribble Valley in the Local Development Framework (LDF) has to be underpinned by a variety of evidence. The Strategic Flood Risk Assessment (SFRA) is one of these evidence documents and is specifically required of all planning authorities by central government. It summarises the current situation regarding national, regional, sub-regional and local flood-risk.

It more detail it describes the current state of various flood related strategies, reports and policy documents produced by a variety of bodies, including significantly the Environment Agency, that will affect the Borough in the near, medium and long terms. It deals in some detail with the most important policy document, Planning Policy Statement25 (PPS25) Development and Flood Risk. It also brings together a variety of other flood related information and will form a part of the evidence lying behind future flood risk policy in the Borough within the developing LDF Core Strategy. This will inform the selection of future development sites, including housing development, in guiding development away from areas of high flood risk.

It allows Local Planning Authorities (LPAs) to apply specific flood related planning tests, including the Sequential and Exceptions Tests, to help them assess the suitability of potential development sites for a variety of different kinds of development.

SFRAs also allow an LPA to understand how current and future climate change will influence flood risks from all sources within its area, and also the risks to and from surrounding areas within the same river catchments. It also informs the Sustainability Appraisal of any Development Plan Documents so that flood risk is fully taken account of when a Planning Authority is considering options and preparing appropriate land use policies. It can also help determine the acceptability of flood risk in relation to emergency planning capability and specify the level of detail required for site-specific Flood Risk Assessments (FRAs) that are required of any developers wishing to develop in particular flood risk areas. Also it contains guidance on Sustainable Drainage Systems (SUDS), which are specific techniques developed to improve the drainage of surface water from new development.

This SFRA has been produced in close consultation with a variety of relevant consultation organisations, including the Environment Agency, and their comments have been incorporated in this final document.

Government recommends a staged approach to developing SFRAs. In local authority areas where flooding is not a major issue and where development pressures are low, a less detailed approach, referred to as a Level 1 SFRA is required. In other more flood prone areas with greater development pressures more detailed Level 2 assessments may be needed. After discussion with the Environment Agency, it is considered that a Level 1 SFRA is appropriate for Ribble Valley at this time. The SFRA should be updated regularly and, should this indicate that circumstances have changed, it may be necessary to produce a more detailed Level 2 SFRA, which will entail consultancy input.

Contents

RIBBLE VALLEY Level 1 STRATEGIC FLOOD RISK ASSESSMENT (SFRA)

May 2010

1. INTRODUCTION - SFRA STRUCTURE, OBJECTIVES and OUTPUTS

1.1 SFRAs provide sufficient data and information on all types of flood risk to enable the Local Planning Authority (LPA) to guide development into locations that minimises the risk of flooding, in part through applying a series of tests, the Sequential Test and the Exception Test. The purpose of the Sequential Test is to steer development away from areas considered to be at risk of flooding. Where development in areas at risk to flooding is unavoidable, such sites must satisfy the requirements of the Exception Test. Both these tests are defined in Planning Policy Statement 25 (PPS25) Development and Flood Risk and are outlined in detail in paragraphs 3.8 to 3.12 and Appendix 1 of this document.

1.2 In addition, the SFRA allows LPAs to:

- fully understand flood risk from all sources within their area and also the risks to and from surrounding areas in the same catchment;
- inform the Sustainability Appraisal so that flood risk is fully taken account of when considering options and in the preparation of LPA land use policies;
- prepare appropriate policies for the management of flood risk within Local Development Documents (LDDs);
- identify the level of detail required for site-specific Flood Risk Assessments (FRAs) in particular locations; and
- determine the acceptability of flood risk in relation to emergency planning capability.

General scope

1.3 PPS25 recommends a staged approach to developing SFRAs. The first stage of the SFRA (referred to below as a Level 1 SFRA) involves defining the extent of flood risk within the Borough. This establishes a baseline, and identifies the areas at risk of flooding based on evidence from a variety of sources, including the Environment Agency (EA), sewerage undertakers, highway authorities and various sections of the Local Authority itself. This document comprises the Level 1 SFRA for the area.

1.4 Where a Level 1 SFRA shows that land outside flood risk areas cannot accommodate the necessary development and the Exception Test needs to be applied, the SFRA should be developed further and consider flood risk and justify the development of specific sites which would not otherwise be

acceptable. This more detailed element of the SFRA is referred to as a Level 2 SFRA in PPS25 guidance.

1.5 The SFRA should inform the thinking behind the options for the allocation of land for development. For housing, this should be done through the Strategic Housing Land Availability Assessment or SHLAA, which is currently being progressed.

Role of SFRA in planning for housing

1.6 Linked to the role of Regional Flood Risk Appraisals (RFRAs) in planning for housing (see paragraph 3.19 and 5.10 - 5.21), SFRAs can help to assess the potential suitability of broad and site-specific locations for housing as required by the Strategic Housing Land Availability Assessments by helping to identify the level of flood risk.

1.7 The SFRA will help determine whether potential sites identified in the LPA's evidence base are suitable to be allocated for housing as part of the subsequent plan-making stages. This will include applying the Sequential Test (and where appropriate the Exception Test) to potential sites to determine whether or not they are suitable to be allocated for housing in relation to flood risk.

Level 1 SFRA Scope and Approach

1.8 As mentioned above a Level 1 SFRA should be sufficiently detailed to allow application of the Sequential Test (annex D table D.1 of PPS25 and Appendix 1 of this document) and to identify whether development can be allocated outside high and medium flood risk areas, based on all sources of flooding, not just river and coastal, or whether application of the Exception Test is necessary. It may also be used to assess how any environmental objectives relating to flooding, as defined in the Sustainability Appraisal, may be affected by additional development. The SFRA must be robust enough to use through the Sustainability Appraisal process.

1.9 Information sources for this SFRA have included:

- Environment Agency Flood Maps (note that these only cover river and tidal flooding);
- the Regional Flood Risk Appraisal (RFRA) (including all sources referred to in the guidance provided on their preparation);
- National Flood and Coastal Defence Database (NFCDD) and National Flood Risk Assessment (NaFRA) available from the Environment Agency;
- expert advice from the Environment Agency, who have also provided reports (including the Ribble Catchment Flood Management Plan) containing the results of detailed modelling and flood mapping studies, including critical drainage areas and historic flood events;

- information from other flood risk consultees, including, sewerage undertakers (in Ribble Valley Borough Council's (RVBC's) case this is United Utilities), and highways authorities (Lancashire County Council), reservoir operators (also United Utilities) and informed local sources;

- geological, soil and sustainable drainage technique information to allow, groundwater and overland flood risk to be assessed.

Level 1 SFRA Outputs and Structure

1.10 The key outputs from a Level 1 SFRA, which are reflected in the structure of this document are:

- plans showing the LPA area, Main Rivers and flood zones, including the functional floodplain if appropriate (as defined in annex D table D.1 of PPS25), across the local authority area, as well as all previously allocated development sites (or sites to be considered in the future);

- an assessment of the implications of climate change for flood risk at allocated development sites over an appropriate time period, if this has not been factored into the plans above;

- areas at risk from other sources of flooding such as surface water and groundwater flooding (N.B. the Environment Agency Flood Map only shows rivers and tidal flood risk);

- flood risk management measures, including location and standard of infrastructure and the coverage of flood warning systems;

- locations where additional development may significantly increase flood risk elsewhere through the impact on existing sources of flooding, or by the generation of increased surface water run-off (a Surface Water Management Plan may be needed);

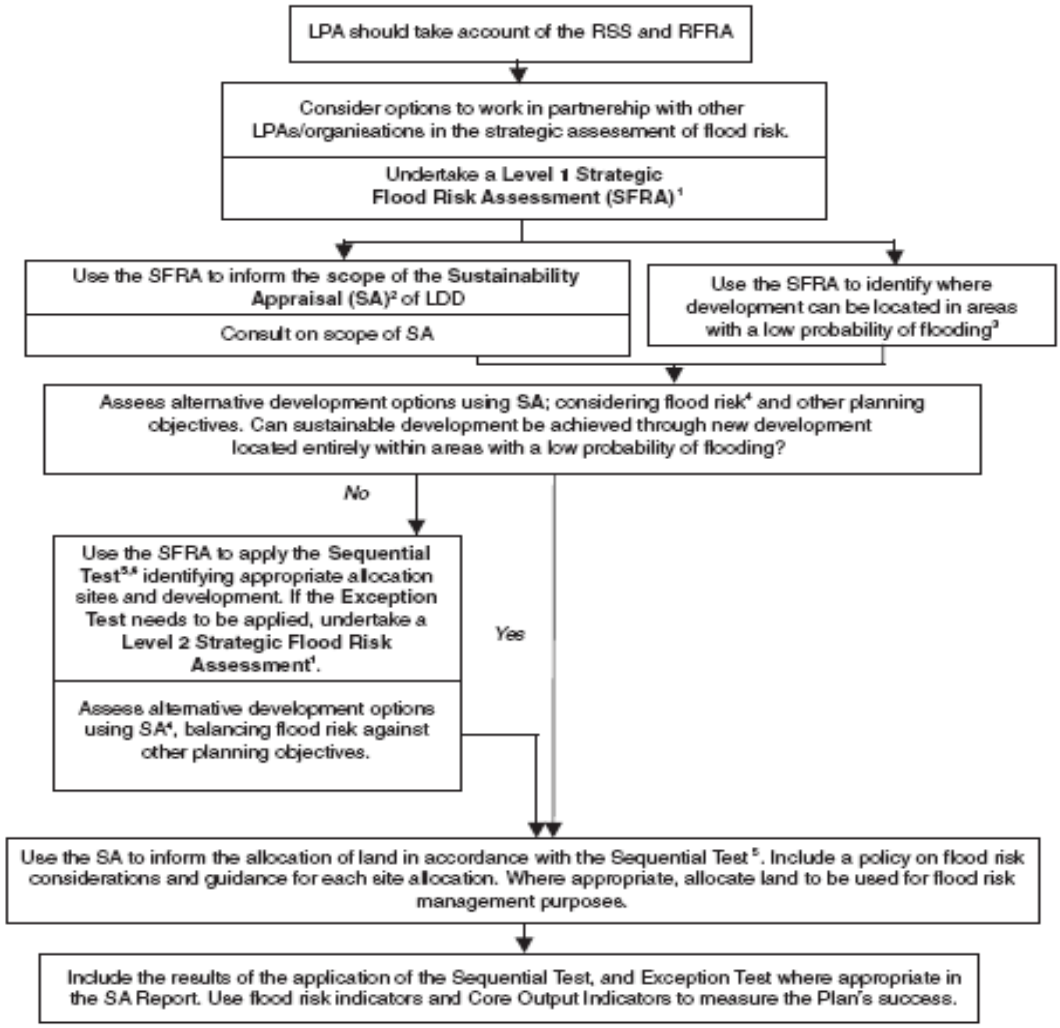
- guidance on the preparation of FRAs; and

- guidance on the likely applicability of sustainable drainage systems (SUDS) techniques for managing surface water run-off at key development sites.

This information should be sufficient to allow application of the Sequential Test and inform the Sustainability Appraisal and subsequent plan policies.

1.11 Following the application of the Sequential Test, if it is found that land in Environment Agency defined Flood Zone 1 (taking climate change into account) cannot accommodate the necessary development and sites in Flood Zone 2, and thereafter Flood Zone 3, need to be considered for development, then the Exception Test needs to be applied to each individual proposal site as a part of a more detailed Level 2 SFRA, including further data collection and/or analysis. The relationship of the SFRA and flood risk to LDDs as described in PPS25 is shown in the diagram below.

Figure 2.4 Taking flood risk into account in Local Development Documents (LDDs)



Notes

1 Guidance on undertaking a SFRA can be found in chapter 3.

2 Guidance on developing the scope of SA can be found in ODPM (2005) *Sustainability Appraisal of Regional Spatial Strategies (RSS) and Local Development Documents (LDD)*. Guidance on suitable flood risk indicators can be found in *Flood Risk Assessment Guidance for New Development FD2320, D2.1*.

3 Flood Zone 1 for fluvial and tidal flooding and with a low risk of flooding from other sources.

4 Including an assessment of the potential effect of proposed development on surface water run-off.

5 Including consideration of the variability of flood risk within a Zone.

6 Including in broad terms, consideration of the variability of flood risk within a flood zone from existing SFRAs.

2. BRIEF DESCRIPTION OF SFRA AREA (Source- Ribble CFMP)

2.1 The River Ribble is a part of a wider catchment, called the Ribble Catchment (as defined in the Environment Agency Ribble Catchment Flood Management Plan (CFMP)). This wider catchment includes the whole of the Ribble Valley Borough Council (RVBC) area. It drains an area of 1,490 km2 in North Yorkshire/Lancashire and covers a distance of around 110 km from source to mouth. The main watercourses include the Ribble, its tributaries the River Hodder, River Calder, all three of which flow through the RVBC area and River Darwen, and coastal streams that drain into the northern shore of the Ribble estuary; and the coastal zone between Preston in the east and Cleveleys, near Blackpool, in the north.

2.2 The Ribble rises high in the Yorkshire Dales and then flows south through limestone hills, moorland and narrow valleys to Settle, then south west towards Clitheroe. South of Clitheroe the Ribble is joined from the north by the River Hodder, a completely rural catchment draining the moors, woodland and grassland of the Forest of Bowland, including Stocks reservoir.

2.3 Just west of Whalley the Ribble is also joined from the east by the River Calder which rises to the south of Burnley and drains, with its major tributary Pendle Water, a catchment area of around 330km2. From the confluence with the Calder the Ribble meanders over a wide floodplain in a south westerly direction, through improved rural land past Ribchester, underneath the M6 motorway, to the tidal limit near Preston.

2.4 Land drainage within the CFMP study area has been significantly altered to allow more intensive agriculture and increased urban development. Some of this development has been in the natural floodplains of local rivers leading to the risk of flooding developed areas such as Burnley, Nelson, Colne, Blackburn and Preston. In many reaches the rivers have also been heavily modified by raised defences and/or culverts.

Main Watercourses in the RVBC Area.

Key Features of River Ribble and its Tributaries (source Ribble CFMP)

River Catchment in RVBC	Area (km2)	Main Tributaries	Main Settlements in RVBC
Upper Ribble to Hodder confluence Bowland	450	Stock Beck	Settle, Bolton-by-Bowland, Bowland, Waddington, Clitheroe
Hodder	265	Brennand, Whitendale, Loud Bridge	Slaidburn, Dunsop Bridge
Calder	330	Pendle Water, Colne Water, Brun, Hyndburn Brook	Whalley

Lower Ribble, (excluding Hodder, Calder & Darwen)	190	Savick Brook, Eaves Brook	Ribchester

2.5 The main watercourses in the RVBC part of the catchment are the Ribble, Hodder, and Calder along with their tributaries. The upper Ribble and Hodder both drain the northern half of the catchment. The headwaters of the Ribble drain from the Yorkshire Dales, whereas the Hodder drains the Bowland Fells. Upstream of the confluence of these two rivers the middle Ribble receives water from the landscape of the Bowland Fringe and Pendle Hill. The two rivers join just south of Great Mitton downstream of Clitheroe. The headwaters of the Calder, including Pendle Water and the River Hyndburn, drain the western flanks of the southern Pennines, dropping down into the Lancashire valleys and the heavily urbanised areas of Nelson, Colne, Burnley, Oswaldtwistle and Accrington. The Calder flows into the Ribble just west of Whalley (at Calder Foot) and within 1km of the Hodder confluence (also known as Hodder Foot). No major tributaries join the Ribble between the Calder confluence and the Darwen confluence near Walton-le-Dale on the outskirts of Preston. Within this reach of the river the channel meanders across a wide floodplain.

2.6 The Lower Ribble, from the tidal limit downstream, enters the low-lying Lancashire Plain before discharging into the Ribble estuary downstream of Penwortham Docks.

Topography, Geomorphology and Soils.

2.7 The catchment's headwater valleys are steep sided with numerous minor tributaries, giving way to less steep valley sides with wider floodplains in their middle courses, such as the Ribble around Clitheroe. These middle parts the catchment are transitional zones through which sediments are passed progressively downstream during flood flows. Downstream of the Calder confluence the Ribble enters a lowland area, the valley here having shallow slopes and the river meanders across a floodplain that is up to 500m-1000m wide before flowing into the estuary downstream of Preston. River sediment such as sand and silt is progressively deposited here.

2.8 The catchment covers a varied landscape ranging from wild uplands to rural agricultural, urbanized and industrial settings. It has high levels of bank erosion and coarse sediment bed material in its upper and mid-reaches, and high levels of silt deposition in its tidal reaches, which could have profound impacts on future levels of flood risk, particularly if associated with future climate change or major land use change. Certain parts of the river valley, including some localities upstream of Clitheroe, are considered to be prone to future instability.

2.9 Although the natural soils of the area are generally waterlogged and poorly drained, the historical practice of moorland "gripping", the excavation of narrow drainage channels over the last century to allow more intensive sheep and grouse rearing, greatly improved the drainage of the upland peat areas of

the upper Ribble, Calder and Hodder, especially from the 1950s to the 1970s. This has allowed rainfall falling on hillsides to be rapidly channeled into the rivers, which can create large peaks in river flow during storm events. Erosion of the open grips can also wash high loads of sediment into the rivers reducing their ability to flow easily and silting up vulnerable aquatic habitats such as spawning gravels.

Land-use and Channel Change

2.10 The area has a wide variety of land use types including rural, agricultural, urban, residential, commercial and industrial. Semi-natural vegetation and bare rock dominates the upland areas of the catchment, supporting extensive moorland and rough grazing. In the rural areas within the middle and upper areas of the main Ribble and in the whole of the Hodder catchment, improved grassland for livestock production is common. There are working and disused quarries in the headwaters and woodland and forestry plantations throughout the catchment. The two largest blocks of woodland are Gisburn Forest, near Stocks reservoir on the Hodder, and Longridge Fell west of Clitheroe. Extensive arable production is generally confined to the better quality soils outside the RVBC area.

2.11 About 12% of the total River Ribble catchment is urban with the remainder being largely rural, mostly improved grassland and semi-natural vegetation. The uplands tend to be used for sheep farming with the lower river mainly being used for dairy farming. Historical drainage of peat moorland, through the installation of drainage grips mentioned above, together with heavy livestock trampling or "poaching", have caused erosion and sedimentation in some watercourses. Diffuse pollution from a variety of dispersed and diverse sources and groundwater pollution resulting from insensitive farming practices in areas of clay soil and limestone geology, water abstraction and an intensification of agriculture are all causes for concern. The varied nature of land use together with natural hydrological changes have altered the shape of local water channels throughout the catchment.

2.12 Of the main tributaries of the River Ribble in RVBC, the River Hodder, is dammed near to its source to form Stocks Reservoir. Despite this and any associated instability in the river channel downstream, the Hodder has a reputation as a high water quality river, with an abundance of otters, salmon and trout. In contrast, the River Calder is described as a post-industrial river, with pollution from relics of mining, contaminated land runoff and sewage discharge. Retaining walls, weirs and culverts constrain parts of the River Calder at old mill sites in Burnley, Nelson and Colne and along the River Darwen is a series of weirs, which create barriers of movement for migratory fish, such as salmon, other aquatic life and river sediments.

2.13 Previous government agricultural subsidy schemes offered payments to agricultural land managers for managing their land less intensively to give environmental benefits. In early 2005, Defra launched a new suite of Environmental Stewardship Schemes (ESS) to secure widespread environmental benefits. The Higher Level Stewardship (HLS) scheme in

particular aims to deliver significant environmental benefits and has a number of objectives including flood management. It could be used to target flood management in parts of the Ribble catchment, for example by establishing more sustainable land use practices which reduce rapid runoff. Environment Stewardship Joint Character Area Targeting Statements have been prepared by a group of stakeholders to target this agri-environment funding to address specific environmental objectives in the area.

Environment

2.14 The area has a number of designated sites of international, national, regional and local importance, Biodiversity Action Plan (BAP) species and habitats for which there are Habitat Action Plans and Species Action Plans. These include the Bowland Fells SPA, part of which lies within the RVBC area.

2.15 The upper Ribble is of high water quality, and is a healthy salmon and trout migratory river. Its slow flowing waters are home to an unusually wide variety of coarse fish including grayling, chub, dace, pike, roach, lamprey, minnow, bullhead and stoneloach. The meandering structure of the river produces steep sandy cliffs on the eroding banks of the meanders and these provide nesting sites for kingfisher, sand martin and goosander.

2.16 The rough marshy grassland next to the river, which periodically floods, is an ideal nesting habitat for waders, in particular snipe, redshank and curlew, while other areas are used by oystercatchers and lapwing. In winter, a variety of waterfowl and waders including whooper swan, pink-footed goose, wigeon, teal, shoveler, tufted duck, water rail and dunlin can be found on the floodplain. Other birds such as black-tailed godwit and ruff use the area on passage.

2.17 The catchment also contains some threatened habitats including fens, coastal and floodplain grazing marsh, mudflats, blanket bog and reedbeds. Many of these have been degraded by land drainage, flood defence and land management changes which have also increased run-off to watercourses increasing flooding. Rivers can provide essential wildlife corridors to help prevent habitat fragmentation and flooding can have a positive, negative or neutral effect on nature conservation sites, depending on their particular characteristics. Catchment policies in the Catchment Flood Management Plan (CFMP) (see 3.20-3.25) have considered the potential implications of such measures for nature conservation.

Communities and Urban Development

2.18 A number of large built-up areas are concentrated in the southern half of the catchment, outside but relatively close to the RVBC area. These are concentrated in the Calder sub-catchment (Colne, Nelson, Burnley, Accrington and Oswaldtwistle) and the Darwen sub-catchment. Clitheroe, (pop 15,000) located right in the centre of the catchment, is the only large town in the more rural northern or upper part of the Ribble catchment.

2.19 As a part of the response to the decline in many of the area's traditional manufacturing and related industries certain places have been targeted for economic and physical regeneration, including Blackburn, Darwen, Accrington, Padiham and Burnley. These towns contain some of the most deprived areas in England and also contain flood risk/problem areas. The social consequences of any flooding here could be considerable.

2.20 About 50,000 people who live within the wider Ribble catchment (ie the whole catchment, not just the RVBC area) are at risk of flooding from the 0.1% AEP flood extent. The AEP is defined as the Annual Exceedence Probability ie the risk of the flood event in any one year. The 0.1% AEP is another way of expressing the 1 in 1000 year flood event (defined geographically as the extent of the Environment Agency defined Flood Zone 2). The 1 in 100 year flood event would be expressed as an AEP of 1% or the extent of Flood Zone 3. Flood Zones are described in more detail in Section 3.

Current Development Situation.

2.21 The recently adopted Regional Spatial Strategy (RSS) and the current development plan, the Ribble Valley Districtwide Local Plan (adopted in 1998) are major influences on the area's current and future development. While the particular flood related policies within these documents are outlined in Section 3, the broad development policy situation in the Borough is summarised below.

2.22 Ribble Valley has an area of 226 square miles, the largest District within Lancashire County, over 70% of which is in the Forest of Bowland Area of Outstanding Natural Beauty (AONB). Much of the area is rural with a number of large and small villages and smaller hamlets. It has a population of c.57,000 and its three main settlements are Clitheroe, Longridge and Whalley. It has a mixed economy and a consistently low unemployment rate with a significant number of residents commuting out of the Borough for work. It has several large employers including Castle Cement and British Aerospace. Most of the employment land allocations made in the 1998 Districtwide Local Plan have been built out and there is continuing demand for more employment development, partly from existing firms seeking new or expanded premises.

2.23 Ribble Valley's attractive environment makes it a desirable area to live in and to retire to and there is consistent pressure for housing development in the area, especially in the rural villages. Current policy has been to guide development into the larger settlements and until recently there had been a policy of housing market restraint in place, as previous housing allocation thresholds had been reached. The pressures on housing and employment above are expected to continue into the future and will be addressed by the policies outlined below.

2.24 The newly adopted Regional Spatial Strategy (RSS) makes it clear in policy DP4 that the priority for future development in the whole of the region will be to focus growth on "existing concentrations of activities and existing

infrastructure" and not involve major investment in new infrastructure, including water supply and sewerage. Where development is unavoidable then it should be phased to coincide with any new infrastructure provision. The broad location of new development will follow a sequential approach which first considers the use of existing buildings within settlements and also previously developed land (sometimes referred to as brownfield land) also within settlements; after consideration of these areas then the use of other suitable infill opportunities within settlements should be examined, if compatible with other policies. Only after these considerations should other land be examined. This land should be well located in relation to housing, jobs, other services and infrastructure.

2.25 Policy DP9 also encourages new development to include adaptation to climate change. Measures include increasing urban densities to limit land take and minimizing the threats from flood risk and increased pressure on water supply and drainage. Also it emphasises the protection of the most versatile agricultural land and the use of Sustainable Drainage (SUDS) techniques.

2.26 RSS Policy RDF2 (Rural Areas) emphasizes the need to define Key Service Centres (KSCs) for the RVBC area. These KSCs should provide a range of retail, leisure, community, civic, health, education, financial and professional services and have good transport links to surrounding towns and villages. Development should be concentrated into these KSCs. Previous definitions of Key Service Centres in previous sub regional plans identified Clitheroe, Longridge and Whalley, together with Wilpshire (as an urban extension of Blackburn), as the RVBC KSCs and they currently are the major focus of development within the existing Districtwide Local Plan. The RSS also states that small scale development to help sustain local services and support local businesses will also be allowed outside the KSCs in more Local Service Centres. The definition of the KSCs and Local Service Centres will be progressed through the LDF process.

2.27 Current greenbelt boundaries will not be reviewed for possible amendment before 2011.

2.28 In terms of employment-related development there are no regionally significant employment sites identified within the RVBC area, though on-going consultations may result in the BAe site at Samlesbury becoming one. RSS states that such sites should ideally be located within the region's urban areas. LPAs are encouraged to review and update current employment land supply and RVBC recently completed such a study. There are no specific amounts of employment land allocated to the RVBC area in the RSS, though Lancashire as a whole is required to supply an extra 294 ha above its 2005 supply. Such land should allow for the growth of existing businesses, allow for mixed-use development and maximize the use of brownfield land. On the completion of a comprehensive review, de-allocated employment land should be considered for other uses including housing.

2.29 Local authorities are encouraged to be proactive in identifying retail development opportunities within town centres and there will be a

presumption against new out of town regional or sub regional comparison retail facilities.

2.30 In terms of housing development there are major housing renewal projects in parts of the wider Ribble catchment, but none within the RVBC area. RVBC is currently undertaking a Strategic Housing Land Availability Assessment (SHLAA) to identify future housing sites. RSS Policy L4 emphasises that, among other considerations, new developments should be served by adequate water supply and sewage management facilities and maximize the use of brownfield land. RVBC has specifically been tasked with providing land for 2900 net additional dwellings for the period 2003 – 2021, an average annual rate of 161 units, with at least 65% to be placed on brownfield sites and within existing urban areas, as mentioned above. It will also be required to maintain a minimum of five years supply of deliverable housing land. RSS states that development sites should not be released until there is sufficient capacity for water and sewage facilities. The exact location of housing sites will be part of the ongoing LDF process guided by the SFRA, SHLAA and other research. The flood risk implications of housing development issues are described within the RFRA (see 5.10 – 5.21 below). United Utilities maintain a sewer flood register and will comment on updates of the SHLAA.

2.31 In terms of transport infrastructure there are no significant developments proposed within the RVBC area within the Regional Transport Strategy, which is a part of the RSS.

2.32 RSS policy EM3 emphasises the role of green infrastructure in mitigating and adapting to climate change, which may have a bearing on other flood related issues.

2.33 Policy EM6 Integrated Water Management emphasizes that plans and strategies should have regards to EU Water Framework Directive, River Basin Management Plans, Catchment Flood Management Plans (such as the Ribble CFMP see 3.20 – 3.25)) and Regional Flood Risk Appraisals (such as the North West RFRA see 5.10 – 5.21). This policy emphasises that development should be located where there is spare capacity in the existing water and sewage facilities insofar as this would be consistent with other planning objectives and, where this is not possible, development must be phased so that new infrastructure can be provided without environmental harm. Mitigation measures must be incorporated in any development that, exceptionally, must be placed in areas of current or future flood risk. It also emphasizes that sustainable drainage systems are required within all new employment, housing or transport development and be retrofitted within existing development.

3. FLOOD PLANNING POLICY REVIEW

National Policy

Planning Policy Statement 25 (PPS25): Development and Flood Risk 2006

3.1 This statement and its accompanying Practice Guide sets out how future flood risk will be addressed through the planning system. It aims to "ensure that flood risk is taken into account at all stages of the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas at highest risk"

3.2 It outlines the various responsibilities of the complex array of different organisations involved in flood management. However it is worth mentioning that there is no general statutory duty on the Government to protect land or property against flooding and that landowners have the primary responsibility for safeguarding their land against natural hazards such as flooding.

3.3 Local planning authorities (LPAs) should consult the Environment Agency (EA) and other relevant bodies when preparing flood risk management policies. Their Sustainability Appraisals, (SAs) land allocations and development control policies should be informed by this SFRA, carried out in liaison with the EA. LPAs must consult EA on all proposals, apart from minor development, within Flood Zone 2 and Flood Zone 3 and on developments of over 1 hectare in Flood Zone 1. If an LPA is minded to approve a development in the face of EA flood risk objections then the LPA must inform the Secretary of State for possible call in.

3.4 PPS25 states that local planning authorities should prepare strategies taking into account the following approaches:

- Identify land at risk and the degree of risk of flooding from river, sea and other sources

- Prepare Strategic Flood Risk Assessments (SFRAs) as freestanding assessments of flood risk that contribute to the Sustainability Appraisal of their LDF spatial plans

- Frame policies for locating development which avoid flood risk where possible and manage any residual risk that cannot be avoided

- Only permit development in areas of flood risk where there are no reasonably available sites in areas of lower flood risk and the benefits of development outweigh the risks from flooding

- Safeguard land from development that is needed for current and future flood management, such as flood storage areas or flood defences

- Reduce flood risk to and from new development through location, layout and design and incorporate sustainable drainage systems (SUDS)

- Use new development to reduce the causes and impacts of future flooding by means such as the re-creation of natural flood plains and green infrastructure which can offer multiple benefits including flood storage

- Work effectively with the Environment Agency and other relevant authorities to ensure that the best use is made of their expertise

- Ensure that spatial planning supports wider flood risk management policies such as River Basin Management Plans and emergency planning.

3.5 PPS25 policies have material consideration force in deciding planning applications and may supersede existing plans. A "risk based approach" to flooding is to be applied to all levels of planning which states firstly that policies should avoid increasing the "sources" or causes of flooding, for instance by minimising run off from new development to minimise increases in downstream flood risk. Secondly policies should manage the "pathways" of water movement and consider the effect that development will have on them and their ability to move and store flood waters. This could involve flood defence works and the location of multi functional green infrastructure combining leisure space with flood storage. Lastly policies should aim to reduce the consequences of flooding on the "receptors" of flooding, such as people, property and habitats, by avoiding locating development in inappropriate areas of flood risk.

3.6 To do this a picture needs to be built up of the local flood risk through the development of the SFRA by local authorities following guidance in the PPS25 Practice Guide. PPS25 also outlines other flood related strategies that operate on other spatial scales. At the regional level Regional Flood Risk Assessments (RFRAs) are the responsibility of regional bodies and influence regionally significant developments. In Ribble Valley's case this is the responsibility of the North West Regional Assembly in conjunction with the Environment Agency (EA). Finally at a relevant site specific level is the Flood Risk Assessment. These should be submitted with a planning application by the developer in consultation with the LPA.

3.7 The SFRA should influence LDF land allocations and individual development proposals by providing the information needed to apply the sequential approach and guiding them to areas at the lowest risk of flooding.

The Sequential Test and Exception Test

3.8 To enable development to be directed into the most appropriate locations. PPS25 requires proposals to satisfy the Sequential Test (ST) and the Exception Test (ET) which are described in more detail in Appendix 1. Briefly the Sequential Test (ST) guides inappropriate development away from areas of flood risk on the basis of the Flood Zones identified in Table D1 of PPS25 ie Flood Zone 1, Flood Zone 2, Flood Zone 3A and Flood Zone 3B (functional

flood plain) together with other information developed through the SFRA process. The EA maps divide areas into three Flood Zones (Zone 3 is highest risk, Zone 2 of medium risk and Zone 1 all other land), and the delineation of Flood Zone 3A and 3B must be undertaken through the SFRA. Flood Zones are described in more detail in Appendix 1.

3.9 Tables D2 and D3 of PPS25 identify the flood vulnerability of different land uses and the compatibility of these land uses in relation to the Flood Zones identified in Table D1. Within Zone 1 all uses of land are deemed appropriate, with increasing restriction through Zones 2 and 3.

3.10 The overall aim is to steer new development to Zone 1, and if no appropriate sites are available in this Zone then sites within Zone 2 are considered, taking into account the increased flood risk of this Zone and the vulnerability of the particular kind of development. Only when there are no reasonably available sites in either Zones 1 or 2 should Zone 3 be considered

3.11 The Exception Test must be applied in certain cases where the ST demonstrates that there are not enough acceptable sites for necessary development in Flood Zone 1 and development in Flood Zone 2 and Flood Zone 3 is the only reasonable alternative. The Exception Test should not be used to justify unacceptably vulnerable development in a Flood Zone (see Table D3, PPS25)

3.12 This Test allows necessary development to occur where the ST alone cannot deliver acceptable sites, provided that they:

- give wider sustainability benefits that outweigh the flood risk;
- are on developable previously developed land and only not so if there is no reasonable previously developable land available
- and are accompanied by a more detailed site specific Flood Risk Assessment or FRA, (see Section 6) prepared by the developer. The FRA must demonstrate that such a development will be safe without increasing flood risk elsewhere. (see Exception Test in Appendix 1)

Regional and Sub Regional Planning and Associated Strategies

North West Regional Spatial Strategy (RSS)

3.13 The RSS deals with flood issues within Policies EM5 "Integrated Water Management" and EM6 "Managing the North West's Coastline", the latter dealing with coastal flooding, of less relevance to Ribble Valley.

3.14 EM5 maintains that plans and strategies should have regard to the following:

- EU Water Framework Directive which directs the production of River Basin Management Plans
- Water Company Asset Management Plans
- Regional Flood Risk Appraisal (RFRA)

3.15 It emphasises that LPAs should manage flood risk by working with Water Companies (in Ribble Valley the provider is United Utilities) and the Environment Agency when planning the location and phasing of new development. This development should be located where there is spare capacity within the existing water supply, wastewater treatment, sewer and strategic surface water mains networks. Where this is not possible then new infrastructure must be provided without environmental harm. United Utilities wishes to state that it is committed to working with the Council to enable compliance with EM5.

3.16 It goes on to state that LPA land allocations should comply with the PPS25 Sequential Test and allows departures from this only in the exceptional cases as described within PPS25. It also states that for those exceptional developments which must be placed within high flood risk areas that there be sufficient flood mitigation measures in place. It goes on to emphasise that all new development should incorporate sustainable drainage systems (SUDs) and water conservation and efficiency measures and encourages that these be retrofitted within existing developments.

3.17 It also underlines the need for sub regional or District level Strategic Flood Risk Assessments (SFRAs) to be produced, guided by the Regional Flood Risk Appraisal (RFRA).

Regional Flood Risk Appraisal (RFRA)

3.18 RFRAs are prepared by regional planning bodies (in Ribble Valley's case this is the 4Northwest) in conjunction with the Environment Agency (EA). They show the broad spatial distribution of flood risk, suggested policies for flood risk to be incorporated in the Regional Spatial Strategies (RSS) and suitable locational guidance criteria for flood risk management in high risk areas, including the consideration of regionally significant uses. They inform SFRAs and are informed by the existing EA Flood Maps and other EA plans such as Catchment Flood Management Plans (CFMPs) and River Basin Management Plans (both mentioned below).

3.19 The current RFRA for the North West was published in October 2008. It emphasises the need to take account of the findings of the RFRAs own Flood Risk Ranking scheme (see detail below 5.10 – 5.22) and integrate them within SFRAs. It also emphasises the need for detailed contact with sewer authorities and a strong LDF policy framework regarding SUDs. It states that developments not incorporating SUDs should not be acceptable unless other material or technical considerations which prevent their use can clearly be identified.

Catchment Flood Management Plan (CFMP)

3.20 The Ribble Catchment Flood Management Plan (CFMP) is a high level strategic plan produced by the Environment Agency (EA) in partnership with local authorities and other bodies. It contains policies to manage flood risk in

the whole River Ribble catchment, which includes the RVBC area over the next 50 to 100 years, and presents an Action Plan laying out how its policies can be achieved. These policies take into account the likely future impact of changes in climate and the effects of land management. The CFMP has been a significant source of information for this SFRA.

3.21 The CFMP does not aim to identify specific measures to manage flood risk, as these will be progressed through more detailed studies. It has an initial 6 year implementation period. The full Plan is available from the following website: **http://www.environment-gency.gov.uk/regions/northwest/1072087/1697836/?version=1&lang=_e**

3.22 It acknowledges that climate change is likely to lead to bigger and more frequent floods and goes on to state that flooding cannot be completely eliminated but can be managed to minimise risk. It goes on to establish, for particular parts of the catchment, whether action should be taken by EA and others to increase, decrease or maintain the current level of flood risk.

3.23 In more detail it brings together a variety of data including topographical, land use, hydrology, historical flood information and current flood risk management information to try to predict likely future changes. It then goes on to develop a set of future scenarios based on these likely changes which describe the likely future flood risks facing the area. Having done this the Plan then develops a set of generic policy options, each evaluated against a set of environmental, social and economic objectives. It then assigns a "Preferred Policy" from this set to each particular sub area (or Policy Unit) of the catchment. The individual Policy Units, their Preferred Policies and the justifications for the policy selection are shown in CFMP Table 6.2 (see pages 92- 96 of the Plan). CFMP Section 6 also lays out a Strategic Environmental Assessment (SEA) of the Preferred Policies.

3.24 The Plan then goes on to describe how its Policies for each part of the catchment will be delivered in its Action Plan section. This is broken down by Policy Unit, and includes the Preferred Policy and a set of prioritised Actions, each allotted to a relevant partner organisations who are tasked with delivery.

3.25 Those Policy Unit containing areas lying within Ribble Valley and their chosen Preferred Policy options are summarised below. Detailed justifications for the selection of policy options for these areas, and the proposed actions to be taken to deliver any necessary changes, are shown in Appendix 4:

A. Upper Ribble and Hodder Policy Unit

The proposed policy is that of no active intervention (including flood warning and maintenance) and that the Agency will continue to monitor and advise.

B. Bowland Fell Policy Unit

The preferred policy is to take action with others to store water to manage run off in locations that provide overall flood risk reduction or environmental

benefits, either locally or elsewhere in the catchment.

C. Clitheroe Policy Unit

Preferred policy here is to take further action to reduce flood risk in this area.

D. Calder Policy Unit

The preferred policy here is to continue with existing or alternative actions to manage flood risk at the current level. This is a mostly rural area with a few isolated flood risk areas. However flood risk will rise in the future and therefore actions will need to be taken to return this risk to its current level. This unit contains the Whalley Flood Warning Area.

E. Lower Ribble Policy Unit

The preferred policy is to take further action to sustain the current level of flood risk into the future in response to potential increases in risk due to urban development, land use change and climate change. This is a mostly rural area with a few isolated flood risk areas, one of which is the Ribchester Flood Warning Area.

3.26 As mentioned above, some of the Policy Units above have delivery Actions relating to them that are either in part or whole the responsibility of the local authority as a partner body. Other actions are the responsibility of other organisations such as the EA. These are outlined in more detail in Appendix 4

Flood Risk Assessments (FRAs)

3.27 FRAs are site-specific flood risk assessments to be prepared by the developer as part of planning applications for sites in areas of flood risk and should make clear all the flood risks associated with a development. The need for their preparation should be indicated within LDF policies. A developer would not need to undertake a Sequential or Exception Test for sites allocated in an Local Development Document (LDD) but they will still be required to produce a FRA for their proposed development to identify proposed flood risk mitigation. The SFRA will identify preferred mitigation measures to make the development acceptable as part of a Level 2 assessment, should one be needed, but the developer must produce the site-specific risk assessment in relation to any future proposal.

3.28 If the development is not in accordance with the LDD, or the Sequential and Exception Tests have not been applied to the LDD and the site is in a flood risk area, then the developer will need to produce an FRA.

3.29 PPS25 contains advice on how to manage flood risk through the design of development where there are no suitable alternative options. This advice includes site layout, measures to direct the most flood vulnerable elements towards those areas of the site at least risk and using lower lying land as a multi purpose flood storage and green amenity space. Other design elements

include raised floor levels, ground floor flood compatible uses such as car parking, with residential elements at first floor level and individual flood gates across doorways and air brick covers.

4. CURRENT FLOOD RISK

Generic Types of Flooding

4.1 There are a number of different forms of flooding presenting a range of different risks:

Flooding from Rivers and Streams

When river flow exceeds the capacity of its channel it will flood into the surrounding flood plain. Flooding can develop quickly or slowly depending on factors such as gradient and how fast water runs off into the surface watercourses. In large, relatively flat catchments river floodplains can store and gradually release floodwaters. In small, steep catchments local intense rainfall can cause dangerous local flash flooding that can quickly threaten areas downstream. In addition to natural features such as topography, the form and location of development can also influence the speed, direction and volume of flooding.

Flooding from the Sea.

On the coast storm surges and high tides can threaten low lying coastal areas, and can be sometimes large and rapid enough to overtop defence works, causing significantly more damage than river flooding. However sea flooding is not considered a risk to the RVBC part of the catchment.

Flooding from Land

If intense rain is unable to soak into the ground or be carried through man made drainage systems, for a variety of reasons, it can run off over the surface causing localised floods before reaching a river or other watercourse. This surface water runoff can be increased by man-made development and was a significant part of the major 2007 UK floods. Flooding of this kind can also be polluted with domestic foul sewage, increasing its hazard.

Groundwater Flooding

In some areas underground permeable rocks can become saturated by rainfall, releasing water onto the surface as floods into intermittent channels, or gradually flooding areas as the local water table rises. This can sometimes be a seasonal phenomenon, water tables rising in the wetter winters before dropping again in the summer. It is related to specific geological conditions and rock types. It also is slower to develop and slower to recede than other types of flooding. This is not considered by the Environment Agency to be a significant flood risk factor in the RVBC area.

Sewer Flooding

Rainfall from urban areas is often drained into either man made surface water drains or "combined" surface and waste water sewers. Blockage or intense rainfall beyond the system's capacity can cause flooding. The foul sewage involved in these floods can add pollution to the flood damage.

Reservoir Flooding and Other Artificial Sources

Finally a variety of man-made structures such as reservoirs and canals, quarries and mines or adapted natural water bodies, such as artificially raised lake or ponds that store water, can cause flooding if they fail. These can be sudden and catastrophic events and may involve contaminated water. However, flooding through reservoir failure is a theoretical risk which is very small. Under DEFRA guidelines, United Utilities, which own and manage some reservoir facilities in the area, are subject to strict controls on the publication of information relating to such matters and do not consider that potential reservoir related flooding issues would be used as grounds to refuse planning permission.

4.2 Given the range of flooding sources and the area and diversity of the Borough, it is unsurprising that most of these types of flooding are relevant to the district both in terms of historic events and current risk.

Historic Floods (source Ribble CFMP)

4.3 A record of the major floods that have affected the Ribble catchment since 1600 has been put together from the British Hydrological Society's "Chronology of British Hydrological Events" and from the Environment Agency Section 105 – River Ribble Survey in 1998. The Environment Agency study found major flood events that had been reported in local newspapers. Those which affected RVBC communities are recorded below. Other major floods were reported in 1771 and 1775, but no actual date of occurrence has been identified. The flood of 17 November 1866 caused the most serious and widespread flooding throughout the Ribble catchment over the last 200 years, affecting both upland tributaries and the main river as far as Preston.

4.4 Table 1 shows a list of major historical floods in the Ribble catchment that caused widespread flooding and affected local communities.

Table 1 Major historical floods recorded in the Ribble catchment and RVBC communities worst hit
(Source Ribble CFMP)

1771 Ribble	No information available
1775 Ribble	No information available
1866 Ribble, Calder,	Whalley, Clitheroe, Ribchester,
1881 Ribble, Calder, Hodder	Slaidburn,
1923 Ribble, Calder	Clitheroe

1936 Ribble, Hodder, Calder	Slaidburn, Whalley, Clitheroe, Bolton-by- Bowland
1995 Ribble, Calder, Darwen	Ribchester
2000 Ribble, Calder, Darwen	Ribchester,
2002 Calder, Darwen	Whalley

4.5 Of the major historical flood events recorded there appears to have been a concentration of floods in July and August, many associated with short-lived but very intensive convectional rainstorms, often over built-up areas (for example Preston, Burnley, Blackburn) which produced rapid runoff. The months of March, April and May did not experience any major floods.

4.6 There is also a seasonal aspect to flooding. Research over more recent years has been carried out using flood event data from the Ribble, Calder and Darwen. All these rivers have similar high flow events, with most occurring in the autumn and winter months and fewer in spring and summer. This is what would be expected to happen for relatively large river systems responding to frontal type rainfall. Many of the smaller flooding issues in the headwaters may show a different seasonality as they are caused by short and intense summer thunderstorms rather than longer duration events.

River Flooding

4.7 The Environment Agency (EA) produces and regularly updates a series of Flood Zone maps for the area. The Flood Zones provide an indication of the areas that may be at risk from flooding from tidal or fluvial sources, ignoring the presence of defences or other man made infrastructure.

4.8 The Food Zones in the Ribble Valley District relate to fluvial flooding only. Flood Zone 2 is the extent of the area of medium flood risk, having between a 1 in 100 and 1 in 1000 annual probability of flooding (between a 1% and 0.1% risk). Flood Zone 3 is the area at high flood risk, having a 1 in 100 annual probability or more of flooding (1% or greater risk). An area not within Zone 2 or Zone 3 is designated as Flood Zone 1 ie low risk of flooding with a probability of less than 1 in 1000 (or less than 0.1%). All proposed development within Zones 2 and 3 or over 1 hectare in Zone 1 will require a FRA (see Section 6 below)

4.9 Within PPS25 Table D1, Zone 3 is further sub divided into Zone 3A and Zone 3B. Flood Zone 3B is defined as the functional floodplain (see 4.11 below), while Flood Zone 3A is defined as that part of Flood Zone 3 which is not within the functional flood plain. EA Flood Zone maps do not differentiate between Flood Zones 3A and 3B. Development which is considered appropriate to Flood Zone 3A and 3B are identified in Table D2 and D3 of PPS25 (see Appendix 1)

Flood Zone 3B (Functional Floodplain)

4.10 This is land where water has to flow or be stored in times of flood. It is defined as land which would flood with an annual probability of 1 in 20 (5%)

or greater in any year, or is designed to flood in an extreme (0.1%) flood, or at another probability agreed between the LPA and the Environment Agency, including water conveyance routes.

4.11 Areas which would naturally flood with an annual probability of 1 in 20 (5%) or more frequently, but which are prevented from doing so by existing infrastructure or solid buildings, will not normally be defined as functional floodplain. Developed areas are therefore not generally considered to be a part of the functional floodplain and are defined as Flood Zone 3A.

4.12 PPS25 Practice Guidance states that one of the outputs of a Level 1 SFRA should be a plan of the functional floodplain, if appropriate. It goes on to state that the definition and mapping of the functional floodplain in locations where this is required should be one of the outputs of a Level 2 SFRA.

4.13 Settlement in Ribble Valley is made up of a number of larger towns – the three key towns of Clitheroe, Longridge and Whalley and also in a number of villages and hamlets spread across the largest District in Lancashire. RVBC has specifically been tasked with providing land for 2900 net additional dwellings for the period 2003 to 2021, an average annual rate of 161 units, with at least 65% to be placed on brownfield sites and within existing urban areas. There are no specific amounts of employment land allocated to the RVBC area in the RSSS, although Lancashire as a whole is required to supply an extra 294 Ha above its 2005 supply.

4.14 Following discussion with the EA, it is proposed that all rural/undeveloped sites within Flood Zone 3 should, at this stage, be identified as "potential" Flood Zone 3B. Such sites should be subject to further investigation if, following the application of the Sequential Test, there are no alternative sites at a lower flood risk available for development. Sites that are subsequently defined as Flood Zone 3B as a result of further modeling and analysis for a Level 2 SFRA will be restricted to appropriate land uses.

4.15 It should be noted that some infrastructure or urban areas may have been designed and constructed to periodically provide flood storage capacity, however this should be considered within any Level 2 SFRA where required. The area defined as functional floodplain should take into account the effects of any defences and other flood risk management infrastructure.

4.16 Within Zone 3B only water compatible uses and the essential infrastructure listed in PPS25 Table D2 (see Appendix 1) that have to be there should be permitted in this zone. Such development should be designed and constructed to:

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

Essential infrastructure in this zone should pass the Exception Test

4.17 There may be opportunities to reinstate areas that can operate as functional floodplain. Previously developed land adjacent to water courses may provide opportunities to incorporate space for flood water to reduce flood risk to new and existing development.

Surface Water and Sewer Flooding

4.18 United Utilities (UU) is responsible for all public sewers within the Borough, which take both rainfall running off from buildings and land through non-highway related drains and also other types of foul sewage to treatment works prior to being cleaned and then returned to the environment. Sewer undertakers are not statutory consultees of planning applications. UU maintain an internal Flood Register of properties with historic flooding problems.

4.19 United Utilities have 786km of water mains and are responsible for 225km of public sewers within the Ribble Valley Borough Council area. These deal with surface water, foul water and include some systems which combine both. They are investigating ways to monitor their network systems more effectively but are currently not able to supply information which would advise where there is capacity to serve development on a Borough wide basis. They can advise their utility service capacity to serve new development, including comments on flood risk, if given the specific location and site outline details of a manageable number of proposed development sites.

4.20 UU have made some comments on sewer capacity issues relating to sites that have emerged from recent (2008) Strategic Housing Land Availability Assessment (SHLAA) research. UU will also continue to offer such comments on sewer capacity issues on any future sites as they emerge.

Locations Where Additional Development May Increase Flood Risk Elsewhere

4.21 This SFRA has been produced in advance of formal LDF development site allocation documents. However it is important that it outlines as far as is practicable how the surface water run off from future development that may impact on areas beyond the immediate site, and possibly on areas outside the Borough, will be managed.

4.22 The approach will be that surface water run off from any future site allocations, whether greenfield or brownfield, must be attenuated to existing rates at minimum, ie surface water runoff from a proposed site will be no greater as a result of development. In accordance with PPS25 and the associated Practice Guide, where appropriate, developers will be encouraged to over-attenuate runoff from new development as much as is reasonably practicable, ie ensure surface water runoff from a proposed development site will be reduced as a result of development.

Private Sewers

4.23 There are a number of private sewers in the area of which there is limited knowledge. Where private sewers cause flooding of a public highway then Highways Authorities have a right to deal with the problem. However there does not appear to be a comprehensive database of any flooding risks associated with private sewers, nor is there an organisation charged with compiling one. The Government is currently reviewing whether all private sewers should come under the control of the sewerage authorities.

Highways Drainage

4.24 In addition to the public sewers mentioned above there are some parts of the local road drainage system that have had flooding problems that could also affect adjacent land. The area's highways are the responsibility of Lancashire County Council (LCC) Highways Department and their responsibilities are outlined in detail in Appendix 2. Briefly LCC are tasked with ensuring that roads and associated thoroughfares such as cycleways and footpaths are free from flooding, protecting road foundations and preventing water from private land flooding the highway. They maintain, on a Borough wide basis, a list of sites which have had a road drainage problem and have made these available to the authority to inform potential development sites emerging through the SHLAA research.

Groundwater Flooding

4.25 Following consultation with the EA, no evidence of groundwater flooding in the area has been identified. While no risk has been demonstrated, this is not to say that unrecorded groundwater flooding events may have taken place or that groundwater flooding may not occur in the future, but using the best available information they are not considered to be a significant risk at this time.

Reservoir Inundation

4.26 The Reservoirs Act of 1975 regulates the safety of reservoirs, including regular inspection. Since 2004 the Environment Agency has been responsible for enforcing this regime on reservoirs that hold at least 25,000 cubic metres of water above natural ground level and the Health and Safety Executive for facilities smaller than this. Reservoir undertakers are required to draw up Flood Plans for specific sites using DEFRA guidance. These give assessments of the impact of catastrophic failure and include extents of areas which could be inundated and other Emergency Services procedures.

4.27 United Utilities are responsible for reservoir facilities within the RVBC area and maintain 7 impounding reservoirs and 25 service reservoirs. An impounding reservoir is a large facility in which water is stored from the wet season to the dry season. A service reservoir is a smaller facility which contains water that is treated and is designed to be large enough to meet the day and night-time needs of its service area. Under DEFRA guidelines, United Utilities are subject to strict controls on the publication of reservoir related information.

4.28 The Pitt Review (Recommendation 57) recommended that Government should provide Local Resilience Forums (LRFs see 4.42 below) with inundation maps for large and small reservoirs to allow them to assess risks and make contingency and other plans and also that the public should be able to view outlines of these plans as a part of wider flood risk information. The Government has supported this and work is underway in the Environment Agency to provide inundation maps to the LRFs by the end of 2009. These maps will show the potential extent of the area that might be flooded from a dam failure. The emergency services and others on the LRF will also receive information on the potential characteristics of the inundation together with guidance on preparing off site Emergency Reservoir Flood Plans and the outline maps to be publicly available.

4.29 Level 2 SFRAs consider the risk posed to any potential land allocation that may be at risk of flooding from a reservoir. The risk will be dependent on the proximity to the reservoir and the size of the feature.

Additional Current Flood Risk Analysis Within Ribble CFMP

4.30 The CFMP uses Environment Agency Flood Zone maps and adds to these the results of various existing hydraulic models of specific parts of the Ribble catchment, including parts of the RVBC area, to develop a broad scale strategic model of flooding. This model is used to test the impact of future scenarios such as climate change, urbanisation and land use management change. This modelling will not however be as accurate as the results of any detailed studies in the area.

4.31 In terms of risk to people the models showed the number of properties and people at risk in a 1% event (ie one in a hundred year flood, which represented by Flood Zone 3 on the EA Flood Maps) and in a 0.1% event (ie a one in a thousand year flood and the equivalent of an area represented by Flood Zone 2 on the EA Flood Maps).

4.32 In terms of the depth of flooding from a 1% event Ribchester is identified as potentially suffering flooding of up to 2m depth and Whalley would experience flood depths of 0 to 1m.

4.33 The CFMP cautions that there are social groups, such as the long term sick, elderly, single parents and others, who are particularly vulnerable and may need extra help in recovering from a flood event. The model indicates that there are areas of "high" and "very high" social vulnerability to flood events in Clitheroe and Ribchester and areas of "high" social vulnerability in rural areas of the Borough.

4.34 In the RVBC area a 1% (1 in 100 year) flood event would also affect some of the area's transport routes. The railway from Blackburn to Settle is at risk from flooding at both Gisburn and Whalley, while the A59 is at risk at Whalley and the A671 at Clitheroe.

Current Flood Risk Management

Condition and Maintenance of Flood Defences

4.35 The Environment Agency inspects all structures whose main purpose is flood defence at least once every six months and gives them a rating between 1 (very good) and 5 (very poor). Defences are awarded an overall condition as well as a worst condition rating. The Standard of Protection (SoP) and condition of flood defence structures in the main flood risk areas is summarised in Table 2 below Few of the fluvial defences in the area have an SoP greater than 1 in 40 years.

4.36 The defences on the Ribble located upstream of the confluence of the Ribble with the Calder in RVBC defend significant areas of agricultural land against flooding. Agricultural flood defence and drainage works on the Ribble floodplain may well be a number of centuries old, though the current defences probably date from the 19th or 20th Centuries. Agricultural flood defences of this kind typically have a SoP (Standard of Protection) of less than 5 years, so these would be easily overtopped in extreme events. While many of the structures in the catchment are in a fair condition there is cause for concern in the Calder catchment, especially in Burnley and Barrowford.

Table 2 - Flood defences in known flood risk/problem areas in RVBC Area

(Source Ribble CFMP p98)

Note: NFCDD – National Flood and Coastal Defence Database

Flood Risk Area	Description of Flood Defences	Standard of Protection	Overall Condition	Worst Condition
Bolton-by-Bowland	No flood defence identified within NFCDD	-	-	-
Sawley	No flood defence identified within NFCDD	-	-	-
Waddington	No flood defence identified within NFCDD	-	-	-
Low Moor	Small defence on left bank	1 in 25 years	Unknown	
Clitheroe	No flood defence identified within NFCDD	-	-	-
Slaidburn	No flood defence identified within NFCDD	-	-	-

Dunsop Bridge	No flood defence identified within NFCDD	-	-	-
Whalley	Flood defences present on right bank of Calder upstream of Whalley Bridge	1 in 40 years	3	3
Ribchester	No flood defences identified within NFCDD	-	-	-

4.37 The Environment Agency have permissive powers to maintain and repair flood defence assets on main rivers. These include flood defence embankments, walls and other structures such as weirs, sluices, culverts, pumping stations, flood basins, trash screens and river channels. This helps to reduce flood risk in some areas. They do not repair and maintain informal defences, which are mostly in the tidal parts of the CFMP area. In general, EA believe these are in a reasonable condition. The EA main watercourse and flood defence maintenance programme operates at three levels:

- Routine rolling programme (for example mowing, vegetation clearance/spraying, pumping station maintenance, culvert grid inspection).
- Heavy maintenance programme (for example structural work to defences, culverts, and tidal flaps) prioritised according to knowledge of local flood defence officer.
- Reactive maintenance programme (for example tree fall, culvert blockage, repair to tidal flaps) as and when need arises.

Environment Agency maintenance and inspection activities (2005/6)

4.38 The Environment Agency usually carry out routine maintenance annually prioritised as high, medium or low, with high priority given to works that minimise flood risk to properties. They also carry out, after wide consultation, actions in response to specific problems that could lead to increased flood risk and/or higher spending in the future.

4.39 The majority of the maintenance and inspection spend on main rivers is delivered within the main urban areas of the catchment, where culverts may become blocked as a result of litter, waste, or other debris. Full culvert inspections are made at specific locations and the frequency of these inspections depends on the historic problems associated with each site. It has introduced trash screens at main locations and implemented a maintenance regime to ensure that all critical culverts known and/or perceived to have resulted in flooding in the past are cleared of debris on at least a fortnightly basis, and weekly during the winter months. A proactive approach considerably reduces the risk of blockage, and localised flooding. The Environment Agency cannot fully remove the risk of blockage, but its Operations Team are tasked with responding to blocked culverts on main river watercourses. Local authorities also regularly inspect and maintain culverts on watercourses for which they are responsible. The Environment Agency has

recently changed its approach to asset management. Instead of looking at how structures perform on their own, it will look at how they perform alongside associated structures.

Flood Incident Management

4.40 Flood incident management includes flood forecasting and flood warning during an event. Flood warning does not reduce the probability of a flood event happening but can reduce its effects. The Environment Agency Flood Warning Investment Strategy shows that a timely flood warning where the recipient takes appropriate action can reduce the cost of damages by 30%. With current warning systems and readiness of recipients a reduction of 10% in economic damage is thought to be more realistic.

4.41 The Environment Agency have a target of providing a flood warning service to 78% of properties within the Indicative Flood Plain Map (IFM) by 2007 and ensuring that 78% of people living in flood risk areas take effective action. In addition they have a target (from the '*Creating a Better Place*' document, section 1.3.5) to provide warnings to 56% of properties within the extreme flood outline (the 0.1% event) by April 2007. In North West region it reports these targets for each of its areas and in North West area, which includes the Ribble catchment, it states that it will meet or exceed these targets.

4.42 The Civil Contingencies Act 2004 places duties on a variety of organisations to assess risk, plan for emergencies such as flooding and put in place arrangements to warn, inform and advise. These bodies include the emergency services, NHS organizations, local authorities and the Environment Agency, transport companies, utilities and others. These bodies liaise locally through a "Local Resilience Forum" (LRF) chaired in Lancashire by the Assistant Chief Constable. The LRF allows bodies to consult and collaborate to facilitate emergency planning and it produces a Community Risk Register. Ribble Valley Borough Council has initiated a District Response Forum (DRF) made up of a geographically relevant multi agency group. The DRF takes into consideration the Community Risk Register issues and extends their scope into the RVBC area.

Flood Warning Areas

4.43 The Environment Agency has identified four formal Flood Warning Areas in RVBC, these are: Low Moor (Clitheroe), Mearley Brook (Clitheroe), Whalley and Ribchester. The EA is the lead authority in flood risk management in England and its staff produce flood event forecasts. Its role in a flood event is to issue flood warnings to the public, local authorities, emergency services and the media. The Ribchester and Whalley Flood Warning Plans, which include maps, are available at the links below:

Local Flood Plan for Ribchester (produced by RVBC and encompassing the Environment Agency Flood Warning Area):

http://www.lanmic.org.uk/PDF/Flooding/FLOOD%20-%20RIBCHESTER.pdf

Local Flood Plan for Whalley:
http://www.lanmic.org.uk/PDF/Flooding/FLOOD%20-%20WHALLEY.pdf
Also plans are under development for the two Clitheroe FWAs at Low Moor and Mearley Brook along the same pattern as those above.

4.44 RVBC are tasked with helping to care for people displaced by flooding working closely with Lancashire County Council Emergency Planning, the Police and others emergency services. The District Response Forum (DRF) evaluates and prioritises risk in respect of its resources to provide various support mechanisms including assistance to residents during times of flood and has provided emergency assistance on an ad hoc basis dependent on available resources and local knowledge and experience. Also it will provide engineering advice on ways residents can alleviate flood risk and on site engineering advice during times of extreme flooding. It will also help in disseminating flood warnings.

4.45 Formal Flood Warning Areas exist where detailed flood forecasting, linked to a robust river level monitoring network, can provide reliable flood warnings to the public and businesses. Informal flood warning areas exist where a reliable warning to the public is not possible and where flood warnings are only provided to professional partners of the Environment Agency.

4.46 Any other Flood Warning Areas are likely to be on smaller watercourses as the main urban flood risk areas are already included in the existing warning areas. The Environment Agency aim to provide a 2-hour lead-time for any flood warning (this is the time between the warning and any actual flooding) which allows people to take effective action. Increasing the lead-time to more than two hours does not necessarily improve the outcome of a warning, as people often do not react until they can see that river levels are high and also the number of false alarms (where there is no actual flooding) would increase.

4.47 The Ribble Flood Warning Management Plan established that, with improvements to the gauging network and the flood warning process, flood warning was technically feasible throughout the majority of the Ribble catchment. However there would be insufficient lead times to provide a flood warning service to most of the proposed flood warning areas if the Environment Agency's objective of issuing flood warnings at least 2 hours in advance of a flood was to be met. This was particularly true for areas identified in the River Hodder and River Calder catchments. Research found that if dissemination delays were reduced, it would be possible to provide 2 hours advance warning to most areas. The recent introduction of the National Flood Forecasting System in late 2005 may achieve this reduction in dissemination time.

4.48 However, the Environment Agency in the North West accepts lead times of less than 2 hours, with 1 hour being the minimum. The Environment Agency also run national and local publicity campaigns to make people aware of what they need to do after receiving a flood warning. These are ongoing across the North West, including the Ribble catchment, and aim to help reduce the cost of the

damage associated with flooding. It should be noted that these campaigns are more effective in areas with a stable population and may be less effective in areas with a high population turnover, which are often more socially vulnerable areas.

5. FUTURE CHANGES TO FLOOD RISK

Estimates of future climate and its potential effects on the RVBC area are found in both the Ribble Catchment Flood Management Plan and the recently published Regional Flood Risk Appraisal

1. Ribble Catchment Flood Management Plan (CFMP)

5.1 The CFMP attempts to show how, on a very broad geographical scale, flood risk may change over the next 50 to 100 years. It does this through a series of geographical scenarios developed using sophisticated modeling software. These scenarios are too broad scale to be used to analyse future flood risk on an individual site basis and acknowledge a degree of uncertainty, given the long timescales they relate to. However they do give a general picture of how flooding may be affected by the combined effects of many small individual changes to future land management and also by predicted future climate change.

5.2 The large scale forestation and significant reductions in agricultural drainage in Ribble Valley can lead to reductions in river flows of up to 10%, potentially reducing general flood risk. An intensification in agricultural production can increase peak flows by up to 15%, potentially increasing general flood risk. However a large increase in urban development would only increase peak river flows by 1% and increase the damage estimates of the 1 in 100 year flood by 3%.

Climate Change and Future Flood Risk

5.3 The largest changes in river flows that resulted from the CFMP scenarios however were due to estimates of future climate change. These have incorporated the figures in Table 3 below, which is drawn from PPS 25. These have important implications for future flood risk and therefore the appropriate precautionary approach that will need to be taken towards locating new development in the area.

Table 3 Recommended national precautionary sensitivity ranges for peak rainfall intensities, peak river flows, offshore wind speeds and wave heights. (source PPS25 p16)

	1990 to 2025	**2025 to 2055**	**2055 to 2085**	**2085 to 2115**
Peak rainfall intensity	+5%	+10%	+20%	+30%
Peak river flow	+10%	+20%	+20%	+20%

5.4 The Environment Agency have built into their Flood Maps the 20% increase in river flows from 2025 to 2115 in the above table and the results show that while the change in the geographical extent of flooding is negligible in well-defined floodplains, it can be dramatic in very flat areas. The repetition or "return period" for any given flood also gets shorter.

5.5 In practical terms this means that a development site currently within a lower risk zone (eg Zone 2 in Environment Agency Flood Maps) could in future be re-classified as lying within a higher risk zone (ie Zone 3). This in turn could have implications for the type of development that is appropriate for certain sites, according to its vulnerability to flooding (see PPS25 Table D.2, Annex D). It will therefore be important that developers, their advisors and local authorities refer to up to date versions of the Environment Agency Flood Maps.

5.6 The CFMP uses data from the latest UK Climate Impacts Programme (UKCIP) research to estimate how future climate change estimates impact on the Ribble Valley (CFMP section 4.3.3). The River Ribble will see increased winter precipitation (an increase of up to 25% by the 2080s) and decreased summer precipitation (a decrease of up to 35% by the 2080s). The number of 'intense' rainfall days is also forecast to increase in winter and decrease in summer, as is the 20 year return period rainfall (that is the rainfall that occurs on average once every 20 years) which may increase by 20% in winter and decrease by 25% in summer by the 2080s.

5.7 This means that there may be an increase in winter river flow and therefore flooding in the catchment, particularly in areas vulnerable to main river flooding (for example, Whalley and Ribchester). Areas susceptible to flash flooding from intense rainfall events and areas susceptible to flooding from culverts may see an increase in flooding during the winter and a decrease in flooding during the summer. The amount of snow falling on the catchment is predicted to decrease, implying a reduction in snowmelt events.

5.8 The CFMP modeled the change in the 1% (ie 1 in 100 year flood, geographically the extent of Flood Zone 3) flood produced by a 20% climate change increase (as recommended in the pre -2006 DEFRA CFMP guidelines). This increased river flows by 20%. While this increased water levels for some places eg Blackburn (0.2m) and Burnley (0.3m) there was no increase predicted for the Ribble at Clitheroe.

5.9 There are no detailed models for the effects of future climate change on water courses in the RVBC area. Therefore, in order to estimate the effect of future climate change on the current Flood Zone 3 and on what development it may be appropriate to locate there the approach has been taken to use the current Flood Zone 2 outlines as a proxy for the future extent of Flood Zone 3 until such time as more detailed information is available, such as through a Level 2 SFRA, site specific FRA or further EA flood mapping. This SFRA is a dynamic document which should periodically be reviewed and if necessary updated to ensure that it is based on the best available evidence and is a sound

element of the LDF evidence base.

5.10 There are also no models available for the effect of climate change on the current Flood Zone 2 areas. It is wise to assume that future climate change will increase its extent but it is currently impossible to estimate this adequately. In light of this the proposed approach here will be that any proposed development adjacent to existing Flood Zone 2 should be supported by a detailed FRA which examines the site and takes climate change into account.

2. Regional Flood Risk Appraisal (RFRA) Flood Levels and Flood Risk Ranking Details

5.11 The RFRA predicts that the Ribble Catchment will see a change in water level across the whole catchment of 0.004 metres by 2107 (RFRA Appendix 3).

RFRA Flood Risk Rankings

5.12 The RFRA is a high level strategic assessment by 4Northwest of the potential risk from river and coastal flooding. It is organized on a local authority wide basis. Its geographical scale is not detailed enough to relate to individual settlements or select development sites but nevertheless it does help to assess how future development in the Borough as a whole will be influenced by climate change driven flooding.

5.13 It is based on existing flood risk data held by the Environment Agency, combined with information on future housing development contained in the draft (January 2006) Regional Spatial Strategy (RSS). It contains a series of tables of ranked local planning authorities (excluding the three shire counties) in the region in terms of the relative potential relationship between their flood risk and their anticipated housing development. It has been updated to reflect the recommendations on housing allocations and previously developed land targets set out in the Proposed Changes to the RSS (March 2008), and the release of new Land Use Change Statistics issued by DCLG in October 2007.

5.14 The full tables and more detailed descriptions of how the rankings are derived are available in Appendix 6 of this document. The complete description is available within RFRA Appendix 2, which can be found on the following link: http://www.nwrpb.org.uk/downloads/documents/oct_ 08/nwra_1225454203_Appendi x_2_-_North_West_RSS_-_.xls

5.15 Understanding these rankings and their limitations helps LPAs understand the type and scale of the flood risk management challenge they may face. In Ribble Valley's case the main messages that emerge are:

- Ribble Valley has a relatively low number of existing properties lying within Flood Zone 3 (ie the area at risk of a 1 in 100 year flood.) but it does not show whether any of these properties are at risk of flooding more frequently than this figure, for instance on average once every ten or twenty or fifty years.

- Ribble Valley does have a high ranking in terms of current flood risk. This reflects the number of flood prone properties that, on average, could be expected to flood in one year. This is due primarily in Ribble Valley's case to the relatively large number of those flood prone properties that have a low standard of flood protection (i.e. 894 properties have 1 in 10 standard of protection, giving an average of 89.4 of those properties at risk in any one year. A 1 in 10 standard of protection refers to a level of flood protection that would be vulnerable to a flood that would, on average, occur every 11 or more years, ie would be vulnerable to a once in 11, or once in 15 or once 20 year flood event. (see Appendix 6 and extract of RFRA Table 2b in Appendix 6).

- In terms of the potential for Ribble Valley to possibly locate future new development in urban areas outside flood risk areas (ie its "development pressure"), it has a low development pressure ranking. This indicates that there is some scope to locate future development away from flood prone areas solely on the basis of flood risk.

- The RFRA also attempts to summarise several aspects of flood risk mentioned above in an overall ranking. This takes into account a combination of the numbers of existing properties in floodplains, the standard of flood defences, the level of proposed future housing allocations and brownfield land available for future assumed residential development. Ribble Valley ranks in the middle to lower risk end of the spectrum.

6. FLOOD RISK ASSESSMENT (FRA) GUIDANCE

6.1 Planning applications for development proposals of 1 hectare or greater in Flood Zone 1 and all proposals for new development located in Flood Zones 2 and 3 should be accompanied by a FRA. This should identify and assess the risks of all forms of flooding to and from the development and demonstrate how these flood risks will be managed, taking climate change into account. For major developments in Flood Zone 1, the FRA should identify opportunities to reduce the probability and consequences of flooding. A FRA will also be required where the proposed development or change of use to a more vulnerable class may be subject to other sources of flooding or where the Environment Agency, Internal Drainage Board and/or other bodies have indicated that there may be drainage problems. More detail of the content of FRAs is outlined in Appendix 3.

6.2 The FRA should be prepared by the developer in consultation with the LPA and should form part of an Environmental Statement when one is required.

6.3 The PPS25 Practice Guide gives further detail as outlined below:

a. Responsibilities

Landowners have the primary responsibility for assessing the flood risk to and from their property. Site-specific Flood Risk Assessments (FRAs) are generally prepared by prospective developers for specific development sites. The responsibilities of the developer, LPAs and other key stakeholders in the development control process relevant to new development sites are discussed in chapter 2 of the PPS25 Practice Guide. FRAs may be stand-alone documents submitted by the developer to accompany a planning application, or, where an Environmental Statement is required for a development, the developer should ensure that the FRA is incorporated into this.

b. Objectives

The objectives of an FRA are to establish the following:

- whether a proposed development is likely to be affected by current or future flooding from any source;
- whether it will increase flood risk elsewhere;
- whether the measures proposed to deal with these effects and risks are appropriate;
- if necessary provide the evidence to the LPA so that the Sequential Test can be applied;

and

- where necessary, demonstrates that the proposed development satisfies the requirements of the Exceptions Test

When is a site-specific Flood Risk Assessment required

6.4 It is important to recognise that the Environment Agency is likely to object to a planning application if a FRA is required but not produced, or is deemed to be inadequate. The Standard Application Form (One App) clearly defines when a FRA is needed and a pro-forma is included in Appendix 3. The Environment Agency website: www.environment-agency.gov.uk enables developers to examine whether their proposed site is within Flood Zone 2 or 3 using the Flood Map and also provides guidance on the scope and content of FRAs. However before completing or submitting a FRA, contact with the EA is recommended as map scales on their website are not always accurate enough for the purposes of planning applications.

Scope

6.5 PPS25, (Annex E paragraph E3) sets out the minimum requirements for FRAs. Where SFRAs have been completed, these form the starting point for the site–specific FRA. The scope of a FRA can be very variable depending on the type and scale of development, the type and characteristics of flood risk and whether the development is in accordance with a sequentially tested LDD policy. FRAs should always be proportionate to the degree of flood risk and should make optimum use of information already available. Where a SFRA

has been produced this should provide more detailed information on flood risk as it will cover all sources of flooding. Where no SFRA has been prepared, interim procedures should be agreed with the LPA in consultation with the Environment Agency and any other key consultees.

6.6 The scope of FRAs should be agreed with the LPA in consultation with the Environment Agency and any other relevant bodies, as set out in PPS25 Practice Guide and annex H of PPS25. Pre-application meetings are highly recommended for large developments to ensure that all flood risk issues, including surface water management options, are adequately scoped.

7. SUSTAINABLE DRAINAGE SYSTEMS (SUDS)

7.1 Sustainable drainage systems (SUDS) are a sequence of management practices and control structures designed to drain surface water in a more sustainable fashion than some conventional techniques. SUDS help adaptation to climate change and deliver EU Water Framework Directive objectives for improving water quality. This is reflected in the Government's *Making Space for Water Strategy*.

7.2 SUDS aim to mimic natural drainage and achieve multiple objectives such as removing pollutants from urban run-off at source, controlling surface water run-off from developments, ensuring that flood risk does not increase further downstream and combining water management with green space, which can increase amenity and biodiversity value.

7.3 The term Sustainable Drainage Systems (SUDS) covers the whole range of sustainable approaches to surface water drainage management including:

- source control measures including rainwater recycling and drainage;
- infiltration devices to allow water to soak into the ground, including
- individual soakaways and communal facilities;
- filter strips and swales, which are vegetated features that hold and drain water downhill mimicking natural drainage patterns;
- filter drains and porous pavements to allow rainwater and run-off to infiltrate into permeable material below ground and provide storage if needed; and
- basins and ponds to hold excess water after rain and allow controlled discharge that avoids flooding.

7.4 SUDS aim to reduce the amount and rate of water flow by a combination of:

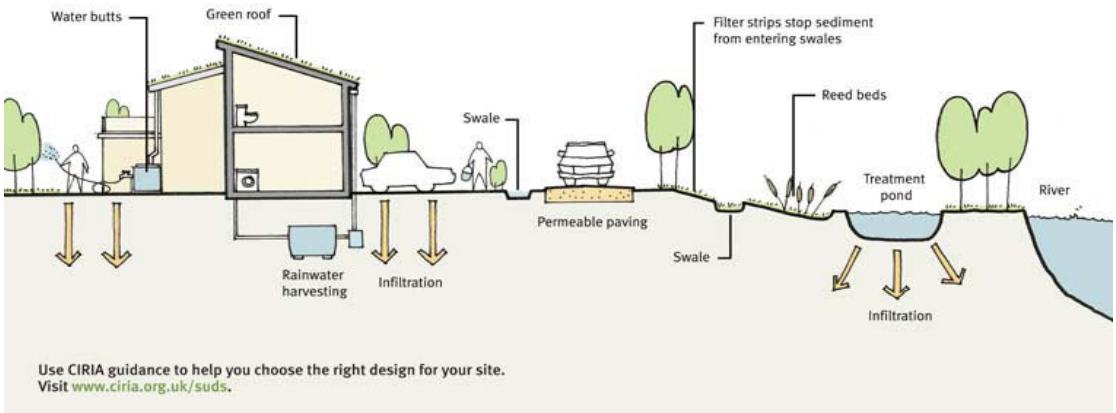
- infiltration into the ground;
- holding water in storage areas; and
- slowing down the movement of water.

Suitability of SUDS Techniques to achieve these aims

	Aim		
Techniques	**Infiltration to reduce run off**	**Holding water in storage areas**	**Slowing down movement of water**
Green roofs		X	X
Permeable paving	X		X
Rainwater harvesting		X	
Swales	X	X	X
Detention basins	X	X	X
Ponds		X	X
Wetlands		X	X

7.5 To realise the greatest improvement in water quality and flood risk management these components should be used in combination, often referred to as the SUDS Management Train. For more detail see:http://www.ciria.org/suds/suds_management_train.htm).

A broad overview of the SUDS philosophy and which techniques are appropriate under different circumstances is provided in CIRIA publication C609, *SUDS – hydraulic structural and water quality advice, 2004*. CIRIA publication C697, *The SUDS Manual* (2007) provides further detailed information.



Source: "Building a Better Environment- A Guide for Developers"- Environment Agency. Illustration Copyright KCA Architects

7.6 Regional planning bodies and local authorities should promote the use of SUDS for the management of run-off. Local planning authorities (LPAs) should ensure that their policies and decisions on applications support and complement Building Regulations on sustainable rainwater drainage. These give priority to the use of infiltration drainage systems over first watercourses and then sewers.

Site layout and surface water drainage systems should cope with events that exceed the design capacity of the system, so that excess water can be safely stored on or conveyed from the site without adverse impacts.

7.7 The surface water drainage arrangements for any development site should be such that the volumes and peak flow rates of surface water leaving a developed site are no greater than the rates prior to the proposed development, unless specific off-site arrangements are made and result in the same net effect.

7.8 For new development, it may be necessary to provide surface water storage and infiltration to limit and reduce both the peak rate of discharge from the site and the total volume discharged from the site. There may be circumstances where it is appropriate for infiltration attenuation storage to be provided outside the development site, if necessary through the use of a Section 106 agreement.

7.9 It is essential that the ownership and responsibility for maintenance of every sustainable drainage element is clear; the scope for dispute kept to a minimum; and durable, long-term accountable arrangements made, such as management companies. These issues should be addressed as part of the FRA. Where the surface water system is provided solely to serve any particular development, the construction and ongoing maintenance costs should be fully funded by the developer. Section 106 agreements may be appropriate to secure this.

7.10 LPAs should work closely with the Environment Agency, Internal Drainage Boards, sewerage undertakers, navigation authorities and prospective developers to enable surface water run-off to be managed as near to its source as possible. Other organisations including highway authorities and water companies should be involved as appropriate.

Appendix 1

The Sequential Test and the Exception Test (Source PPS25, DCLG)

The Sequential Test

D1. The risk-based Sequential Test should be applied at all stages of planning. Its aim is to steer new development to areas at the lowest probability of flooding (Zone 1).

D2. The Flood Zones are the starting point for the sequential approach. Zones 2 and 3 are shown on the Environment Agency Flood Map with Flood Zone 1 being all the land falling outside Zones 2 and 3. These Flood Zones refer to the probability of sea and river flooding only, ignoring the presence of existing defences.

D3. Regional Flood Risk Appraisals (RFRAs) will refer to Environment Agency Flood Maps and will utilise further information such as Strategic Flood Risk Assessments to allow flood risk to be taken into account in a broad regional context (see Annex E para. E4).

D4. Strategic Flood Risk Assessments (SFRAs) will refine information on the probability of flooding, taking other sources of flooding and the impacts of climate change into account. The SFRA will provide the basis for applying the Sequential Test, on the basis of the Zones in Table D.1.Where Table D.1 indicates the need to apply the Exception Test, the scope of the SFRA will be widened to consider the impact of the flood risk management infrastructure on the frequency, impact, speed of onset, depth and velocity of flooding within the Flood Zones considering a range of flood risk management maintenance scenarios. Where a SFRA is not available, the Sequential Test will be based on the Environment Agency Flood Zones.

D5. The overall aim of decision-makers should be to steer new development to Flood Zone 1. Where there are no reasonably available sites in Flood Zone 1, decision-makers identifying broad locations for development and infrastructure, allocating land in spatial plans or determining applications for development at any particular location should take into account the flood risk vulnerability of land uses and consider reasonably available sites in Flood Zone 2, applying the Exception Test if required. Only where there are no reasonably available sites in Flood Zones 1 or 2 should decision-makers consider the suitability of sites in Flood Zone 3, taking into account the flood risk vulnerability of land uses and applying the Exception Test if required.

D6. Within each Flood Zone, new development should be directed first to sites at the lowest probability of flooding and the flood vulnerability of the intended use matched to the flood risk of the site, eg higher vulnerability uses located on parts of the site at lowest probability of flooding.

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

D7. The preparation and review of Regional Spatial Strategies (RSSs) and Local Development Documents (LDDs) should be used to review existing and proposed development in order to allocate land in lower flood risk zones suitable for existing vulnerable uses already in medium and high flood zones, and in doing so, to realise opportunities arising through redevelopment to improve the sustainability of local communities.

D8. When seeking planning permission for individual developments on sites allocated in development plans through the application of the Sequential Test, informed by a SFRA, developers need not apply the Sequential Test, but should apply the sequential approach to locating development within the site. The plan should specify requirements for Flood Risk Assessment (see Annex E)

Table D.1: Flood Zones
(Note: These Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences)

Zone 1 Low Probability

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

Appropriate uses
All uses of land are appropriate in this zone.

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

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

Zone 2 Medium Probability

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

Appropriate uses
The water-compatible, less vulnerable and more vulnerable uses of land and essential

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

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

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

Zone 3a High Probability

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

Appropriate uses
The water-compatible and less vulnerable uses of land in Table D.2 are appropriate in this zone. The highly vulnerable uses in Table D.2 should not be permitted in this zone. The more vulnerable and essential infrastructure uses in Table D.2 should only be permitted in this zone if the Exception Test (see para. D.9) is passed. Essential infrastructure permitted in this zone should be designed and constructed to remain operational and safe for users in times of flood.

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

Policy aims
In this zone, developers and local authorities should seek opportunities to:
i. reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage techniques;
ii. relocate existing development to land in zones with a lower probability of flooding; and
iii. create space for flooding to occur by restoring functional floodplain and flood flow pathways and by identifying, allocating and safeguarding open space for flood storage.

Zone 3b The Functional Floodplain

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

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

– remain operational and safe for users in times of flood;
– result in no net loss of floodplain storage;
– not impede water flows; and
– not increase flood risk elsewhere.
– essential infrastructure in this zone should pass the Exception Test.

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

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

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

Table D.2: Flood Risk Vulnerability Classification

Essential Infrastructure	• Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk, and strategic utility infrastructure, including electricity generating power stations and grid and primary substations.
Highly Vulnerable	• Police stations, Ambulance stations and Fire stations and Command Centres and telecommunications installations required to be operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use. • Installations requiring hazardous substances consent.
More Vulnerable	• Hospitals. • Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. • Buildings used for: dwelling houses; student halls of residence;drinking establishments; nightclubs; and hotels. • Non–residential uses for health services, nurseries and educational establishments. • Landfill and sites used for waste management facilities for hazardous waste • Sites used for holiday or short-let caravans and camping, **subject to a specific warning and evacuation plan**.
Less Vulnerable	• Buildings used for: shops; financial, professional and other services; restaurants and cafes; hot food takeaways; offices; general industry; storage and distribution; non–residential institutions not included in 'more vulnerable' ; and assembly and leisure. • Land and buildings used for agriculture and forestry. • Waste treatment (except landfill and hazardous waste facilities).

- Minerals working and processing (except for sand and gravel working).
- Water treatment plants.
- Sewage treatment plants (if adequate pollution control measures are in place).

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

Water-compatible Development

- Flood control infrastructure.
- Water transmission infrastructure and pumping stations.
- Sewage transmission infrastructure and pumping stations.
- Sand and gravel workings.
- Docks, marinas and wharves.
- Navigation facilities.
- MOD defence installations.
- Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location.
- Water-based recreation (excluding sleeping accommodation).
- Lifeguard and coastguard stations.
- Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.
- Essential ancillary sleeping or residential accommodation for staff required by uses in this category, **subject to a specific warning and evacuation plan**.

Table D.3[22]: Flood Risk Vulnerability and Flood Zone 'Compatibility'

Flood Risk Vulnerability Classification (see Table D2)	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone 1	Development appropriate	Development appropriate	Development appropriate	Development appropriate	Development appropriate
Flood Zone 2	Development appropriate	Development appropriate	Exception test required	Development appropriate	Development appropriate
Flood Zone 3A	Exception test required	Development appropriate	Development should not be permitted	Exception test required	Development appropriate
Flood Zone 3B	Exception test required	Development appropriate	Development should not be permitted	Development should not be permitted	Development should not be permitted

[22] This table does not show: the application of the Sequential Test which guides development to FZ1 first, then FZ2, and then FZ3; FRA requirements; or the policy aims for each Flood Zone.
[23] Developable sites are defined in Planning Policy Statement 3 (PPS3) *Housing* as those sites which should be in a suitable location for housing development and there should be a reasonable prospect that the site is available for, and could be developed at the point envisaged.
[24] Previously-developed land definition (commonly known as Brownfield Land). See Annex B of Planning Policy Statement 3 *Housing*.

The Exception Test

D9. For the Exception Test to be passed:

a) it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a SFRA where one has been prepared. If the DPD has reached the 'submission' stage – see Figure 4 of PPS12: *Local Development Frameworks* – the benefits of the development should contribute to the Core Strategy's Sustainability Appraisal;

b) the development should be on developable previously-developed land or, if it is not on previously developed land, that there are no reasonable alternative sites on developable previously-developed land; and

c) a FRA must demonstrate that the development will be safe, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

D10. The Exception Test should be applied by decision-makers only after the Sequential Test has been applied and in the circumstances shown in Table D.1 when 'more vulnerable' development and 'essential infrastructure' cannot be located in Zones 1 or 2 and 'highly vulnerable' development cannot be located in Zone 1. It should not be used to justify highly vulnerable' development in Flood Zone 3a, or 'less vulnerable'; 'more vulnerable'; and 'highly vulnerable' development in Flood Zone 3b.

D11. The Exception Test should be applied to LDD site allocations for development and used to draft criteria-based policies against which to consider planning applications.Where application of the Sequential Test indicates it needs to be applied, this should be done as early in the plan-making process as possible – in LDDs, including Supplementary Planning Documents (such as site development briefs). This will minimise the need to apply it to individual planning applications.

D12. Where the Exception Test has been applied in LDD allocations or criteria-based policies, the local planning authority should include policies in its LDDs to ensure that the developer's FRA satisfies criterion c) in para. D9. The Environment Agency and other appropriate operating authorities such as Internal Drainage Boards should be consulted on the drafting of any policy intended to apply the Exception Test at a local level.

D13. Compliance with each part of the Exception Test should be demonstrated in an open and transparent way.

D14. Criterion b) of para. D9 reflects the Government's commitment to making the most efficient and effective use of land in line with the principles of sustainable development. Reflecting this, Planning Policy Statement 3 (PPS3): *Housing* sets out the Government's objectives for a flexible, responsive supply of land for housing which gives priority to the use of previously-developed land for development. However, flood risk should be taken into account in determining the suitability of the land for development.

Appendix 2

Highways Drainage Responsibilities
(Source- Lancashire County Council Highways Maintenance Plan 2008 – 09)

Highway Drainage Systems

Objectives for Maintenance and Improvement of Highway Drainage Systems

To provide for the safe operation of the highway network by:

- Ensuring that surface water is removed from carriageways, footways and cycleways as quickly as possible to prevent ponding and flooding that could cause a danger to the public;

- Preventing by the use of appropriate enforcement action, or by direct action where enforcement action is not possible or practicable in terms of obviating danger to the public, the uncontrolled discharge of water from private land or unadopted highways onto the highway such as might cause a danger to the public by the formation of ice, erosion of surfaces or accumulations of debris.

To promote journeys by alternative forms of transport by improving facilities for pedestrians and cyclists by reducing the extent to which water collects on the highway during or following rainfall.

To provide and maintain drainage systems in a manner consistent with the principles of sustainability and effective asset management, including:

- Preventing water from soaking into road foundations such as to cause structural damage;
- Preventing the unauthorised discharge of highway surface water run-off into residential or commercial property such as might cause nuisance or damage;
- Preventing the unauthorised discharge of highway surface water run-off such as might cause flooding of private land adjacent to the highway;
- The use, in appropriate circumstances, of sustainable drainage systems on new development sites and highway improvement schemes;
- Where practicable, taking reasonable precautions to prevent pollution of watercourses;
- Ensuring that ditch cleaning operations are undertaken with due regard to the ecology and bio-diversity status of the adjoining verge and private land.

Service Inspections for Highway Drainage Systems

The Council does not undertake formal Service Inspections . A number of features relating to network serviceability are, however, inspected as part of Highway Safety Inspections.

Blocked gullies:

- Ironwork rocking under load;
- Gully gratings with bars which are parallel to the carriageway;
- Missing covers.

In addition to Safety Inspections, detailed inspections will be prompted by a number of circumstances:

- Inspections carried out as part of a NRSWA inspection;
- Ad-hoc inspections required by perceived conditions;
- Investigatory inspection prompted by service user enquiry;
- Investigatory inspection prompted by feedback from routine maintenance operations.

Highway Drainage Systems Maintenance Categories

Maintenance of Highway Drainage Systems is defined operationally by the following maintenance categories:

- Drainage Cleaning
- Drainage Repairs

Priority Rating for Highway Drainage Works

A priority-rating matrix enables the comparison of drainage problems for allocation of resources. Departures from the priority rating matrix are permitted following a risk assessment having regard to:

- Relative severity of problems under considerations;
- Seasonal variations in potential for formation of ice;
- Action necessary to promote delivery of the Council's objectives for integrated transport, e.g. excessive ponding adjacent to a bus stop or a heavily used footway, ponding over an extensive proportion of a cycle-lane etc;
- Frequency of flooding;
- Number of householders, pedestrians and motorists affected by the problems under consideration;
- Revenue costs of response to flooding incidents e.g. placing signs, road closures, sandbagging etc.

Operational Policy and Standards for Drainage Cleaning

Definition of Activity

- The cleaning of gullies, catchpits or manholes that are the responsibility of the highway authority, the sole purpose of which is to remove water from the highway. (If the drainage system carries roof water or water from private properties, that system is the responsibility of other authorities. In

these cases the highway authority is responsible for highway gullies and gully connections only);

- The testing, rodding and jetting of the highway drainage system. This includes drains, gullies and their connections, inspection chambers, interception pits, piped ditches, grips, kerbed offsets, carriageway drainage on structures and the drainage of subways. The cleaning of drainage installed outside the highway boundaries under licence or easement should be included. Cleaning includes excavation, backfill and reinstatement necessary to jet a gully connection that does not have a rodding facility;

- The maintenance of ditches and grips through the removal of silt, vegetation growth and damage to allow free passage of water from the highway. Except when required in an emergency situation, maintenance should be confined to those ditches that are the responsibility of the highway authority. Roadside ditches are generally the responsibility of the adjacent landowner;

- The clearance or replacement of filter media as necessary to maintain the effective operation of filter drains and soakaways;

- The clearance of silt and vegetation from culverted watercourses and associated debris screens for which the highway authority is responsible. Generally, the highway authority is responsible for culverted watercourses passing under the highway except where it can be shown that another person or authority is responsible. Culverts with a clear span exceeding 1.2m (masonry culverts), 1.3m (concrete box), 1.4m (pipes), or multiple conduits with a waterway cross-sectional area exceeding 2.2 m² are defined as highways structures and maintained in accordance with the operational policy for highways structures.

Appendix 3 - FRA Guidance (source PPS25 Practice Guide p139 – 143)

This pro-forma should be completed and submitted with the planning application for developments for which a Flood Risk Assessment (FRA) is required. Further guidance is available within PPS25 Practice Guide Appendix C. The planning authority and the Environment Agency will be able to advise on the detailed scope of the FRA and their guidance should be sought prior to completing the pro-forma. The level of detail required will depend on the Level of FRA required (see chapter 3 of the PPS25 Practice Guide). This form can be used in conjunction with the standard planning application form.

FRA Pro-forma

1a. What type of development is proposed and where will it be located? Include whether it is new development, an extension to existing development or change of use etc.
1b. What is its vulnerability classification?
1c. Is the proposed development consistent with the Local Development Documents?

1d. Please provide evidence that the Sequential Test and where necessary the Exception Test has been applied in the selection of this site for this development type?

2a. What sources of flooding could affect the site? (see annex C PPS25).
2b. For each identified source, describe how flooding would occur, with reference to any historic records wherever these are available.
2c. What are the existing surface water drainage arrangements for the site?

3a. Which flood zone is the site within?
3b. If there is a Strategic Flood Risk Assessment covering this site, what does it show?
3c. What is the probability of the site flooding taking account of the contents of the SFRA and of any further site-specific assessment?
3d. What are the existing rates and volumes of run-off generated by the site?

4a. How is flood risk at the site likely to be affected by climate change?

5a. Please provide details of the development layout, referring to the relevant drawings.
5b. Where appropriate, demonstrate how land uses most sensitive to flood damage have been placed in areas within the site that are at least risk of flooding.

6a. How will the site be protected from flooding, including the potential impacts of climate change, over the development's lifetime?

7a. How will you ensure that your proposed development and the measures to protect your site from flooding will not increase flood risk elsewhere?
7b. How will you prevent run-off from the completed development causing an impact elsewhere?

8a. What flood-related risks will remain after you have implemented the measures to protect the site from flooding?
8b. How, and by whom, will these risks be managed over the lifetime of the development?

FRA Notes and Guidance

1. Development description and location

a A location plan should be provided at an appropriate scale or cross referenced to the main application.
b Vulnerability classifications are provided in table D.2, annex D of PPS25.
d Evidence is required that the Sequential Test has been used in allocating the proposed land use proposed for the site, and that reference has been made to the relevant Strategic Flood Risk Assessment (SFRA) in selecting development type and design (See paragraphs 16-20 and annex D of PPS25).

Where the site is allocated in an existing LDD the allocation should be referred to. Your Local Planning Authority planning officer should be able to provide site specific guidance on this issue.

e Where use of the Exception Test is required, evidence should be provided that all three elements of this test have been considered (see paragraph 20 and annex D of PPS25). Your Local Planning Authority planning officer should be able to provide site-specific guidance on this issue.

2. Definition of flood hazard

a This may include hazards such as the sea, reservoirs or canals, which are remote from the site itself, but which have the potential to affect flood risk (see chapter 3 of the PPS25 Practice Guide).

b An appraisal of each identified source, the mechanisms that could lead to a flood occurring and the pathways that flood water would take to, and across, the site.

c Inundation plans, and commentary text, for historic flood events showing any information available on the mechanisms responsible for flooding, the depth to which the site was inundated, the velocity of the flood water, the routes taken by the flood water and the rate at which flooding occurred.

d Details of any existing surface water management measures already in place, such as sewers and drains

3. Probability

a,b The flood zones are defined in table D.1 of annex D PPS25. The planning authority can advise on the existence and status of the SFRA.

c This may need to include:

- a description of how any existing flood risk management measures affect the probability of a flood occurring at the site
- supporting evidence and calculations for the derivation of flood levels for events with a range of annual probability
- inundation plans of, and cross sections through the existing site showing flood extents and levels associated with events with a range of annual probability
- a plan and description of any structures which may influence the probability of a flood occurring at the site. This may include bridges, pipes/ducts crossing a
- watercourse, culverts, screens, embankments or walls, overgrown or collapsing channels and their likelihood to choke with debris
- details of any modelling studies completed to define the exiting degree of flood risk (see chapter 3 of the Practice Guide)

d This should generally be accompanied by calculations of run-off rates and volumes from the existing site for a range of annual probability events (see chapter 4 of the Practice Guide).

4. Climate change

a Annex B of PPS25 and chapters 3 and 6 of the Practice Guide provide guidance on how to assess the impacts of climate change.

5. The Development proposals

a Reference should be made to table D.2 of PPS25.

b Chapter 4 of the practice guide provides guidance on how the sequential approach can be used to inform the lay-out of new development sites.

6. Flood risk management measures

a This should show that the flood risk management hierarchy has been followed and that flood defences are a necessary solution. This should include details of any proposed flood defences, access/egress arrangements, site drainage systems (including what consideration has been given to the use of SUDS) and how these will be accessed, inspected, operated a nd maintained over the lifetime of the development. This may need to include details of any modelling work undertaken in order to derive design flood levels for the development, taking into account the presence of any new infrastructure proposed.

7. Off site impacts and proposed mitigation measures

a This should be over the lifetime of the development, taking the relevant climate change allowances into account. The assessment may need to include:

- Details of the design basis for any mitigation measures (for example, compensatory flood storage works and measures to improve flood conveyance). A description of how the design quality of these measures will be assured and of how the access, operation, inspection and maintenance issues will be managed over the lifetime of the development.
- Evidence that the mitigation measures will work, generally in the form of a hydrological and hydraulic modeling report.
- An assessment of the potential impact of the development on the river, estuary or sea environment and fluvial/coastal geomorphology. A description of how any impacts will be mitigated and of the likely longer-term sustainability of the proposals.

b Evidence should be provided that drainage of the site will not result in an increase in the peak rate or in the volumes of run-off generated by the site prior to the development proceeding.

8. Management of residual risks

a Designing for event exceedence on site drainage systems is covered in chapter 5 of the Practice Guide. Guidance on other residual risks is provided in chapter 7.

b Reference should be made to flood warning and evacuation procedures, where appropriate, and to likely above ground flow routes should sewers or other

conveyance systems become blocked or overloaded. This may need to include a description of the potential economic, social and environmental consequences of a flood event occurring which exceeds the design standard of the flood risk management infrastructure proposed, and of how the design has sought to minimise these – including an appraisal of health and safety issues.

Appendix 4 - Ribble Catchment Flood Management Plan - Preferred Policies for Ribble Valley Related Policy Areas

PART 1- POLICY SELECTION

For each of the various relevant sub units of the catchment a policy has been attached from the list of generic policy options outlined below.

Policy Description

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 in to 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 with others to store water or manage run-off in locations that provide overall flood risk reduction or environmental benefits, locally or elsewhere in the catchment

Upper Ribble and Hodder Policy Option P1

Preferred Policy -

No active intervention (including flood warning and maintenance),continue to monitor and advise

Justification -

This very large policy unit (600km2) is predominantly rural, with only a few isolated flood risk areas / problems in the distributed villages. One water treatment works and six sewage works are at risk in a 1% event. Flood risk management activities in this policy unit are minimal due to the low numbers of people at risk, with no flood warning areas and very few if any formal flood defences. A 1-in-100 year flood (1% AEP event) would affect 230 properties, one water treatment works, six sewage works, two schools and two Scheduled Ancient Monuments, and cause £27M of damage. Up to 120 extra properties could be at risk in 100 years in a 'do nothing' scenario, as well as one extra school. It is worth noting that the policy unit is very large in area and so the damages per unit area are very low in comparison with the other policy units. Because of this, policy P5 was not chosen, and P4 was also not seen as being suitable given that the area is not earmarked for significant urban

development or land use change. The potential inundation of the Long Preston Deeps floodplain would represent a P6 policy, although this area is a very small part of the unit and initial modelling has shown that downstream benefits to flood risk of inundating this area are not significant. Despite this, during the life of the CFMP it is likely that areas of P6 policy may be developed in this unit. Given that flood risk management activities in the policy unit are minimal, policies P2 and P3 are also not suitable as they refer more to units where flood risk management activities are to maintained or reduced. Policy P1 therefore represents the dominant policy in the unit, despite some potential small areas of policy P6.

Bowland Fell Policy Option P6

Preferred Policy –

Take action with others to store water or manage run off in locations that provide overall flood risk reduction or environmental benefits, locally or elsewhere in the catchment.

Justification -

This large policy unit (102km2) lies in the upper catchment of the River Hodder, and is entirely rural. It consists mainly of moorland fell areas supporting pastoral farming. Flood risk management activities in the area are minimal, and very few properties are at risk of flooding due to the sparsely populated nature of the policy unit. Because of these reasons, policies P3, P4, and P5 were not deemed suitable due to the very low flood risk. Policy P2 was also not feasible given the already minimal flood risk management activities. Whilst a policy of P1 was feasible due to the low flood risk in the area, because of work progressing under United Utilities' SCaMP project to attenuate flows in the Bowland area, and with further potential for flood storage, policy P6 was chosen to deliver benefits to villages such as Dunsop Bridge and further downstream.

Clitheroe Policy Option P5 –

Preferred Policy –

Take further action to reduce flood risk

Justification -

This very small policy unit (4km2) is entirely urban, but set within a much larger rural catchment with considerable landscape, cultural and environmental interests. About 260 properties are at risk of flooding (1% AEP event), at a cost of £38M worth of damage, with a further 230 properties at risk in 100 years with a 'do nothing' scenario. In addition, 3 schools and 1 hospital are currently at risk in a 1% event, which is not forecast to increase in the future. Flood risk management activities in the town include the maintenance of screens on the inlet and outlet of culverted watercourses, general maintenance of banks of open watercourses, and the provision of formal flood warnings to the Clitheroe and Low Moor areas. Further action is

needed to reduce the predicted effects of climate change and further urban development in and around Clitheroe. Culverted stretches of Mearley Brook pose a high flood risk to the town, and work is required to reduce this risk.

Whilst the projected damages in this unit are not as high as other policy units where P5 is proposed, this level of damage in such a small area indicates the action is needed to reduce the flood risk and therefore a proactive P5 policy is recommended, rather than any policy which would provide a lower level of flood risk management now and into the future. Being a wholly urban policy unit means that, by implications, opportunities for a policy P6 policy are extremely limited, although there is potential for flood storage upstream of the town. Work in this policy unit is likely to get priority on a national scale, with work programmed in Clitheroe to address flood risk. Implementing flood resilience measures within existing and future properties may also help to reduce flood risk.

Calder Policy Option P3 –

Preferred Policy-

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

Justification -

This large policy unit (280km2) is predominately rural, with only a few isolated flood risk areas/ problems in distributed villages. Whilst a 1-in- 100 year flood (1% AEP event) would affect about 410 properties and cause about £22M of damage, it is worth noting that the policy unit is large in area and so the damage costs per unit area are very low in comparison with the other policy units. Therefore, policies P4 and P5 are not suitable for this rural policy unit, where future development will be limited. A P3 policy has been recommended due to the nature of the social and economic flood risk receptors in this policy unit to maintain the current situation (by current or alternative means) whilst recognising that the level of flood risk will increase over time. The introduction of a P1 or P2 policy would represent a significant increase in flood risk in the short to medium term, when it would be preferable to explore alternative flood risk management strategies through P3 policy. The potential for some P6 policies through river restoration and floodplain connection are reasonably good here (e.g. Padiham Meadows), thereby providing additional opportunities for environmental enhancements, though the scale of those areas are small compared to the size of the policy unit.

Lower Ribble Policy Option P4

Preferred Policy –

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

Justification -

This policy unit (144km2) is predominately agricultural (including some of the best and most versatile land), with isolated flood risk areas/ problems in some settlements. Flood risk management activities focus on general bank maintenance in the rural areas where required to open watercourses in the unit, to prevent any blockages and maintain the passage of flows. A 1-in-100 year fluvial flood/1-in- 200 year tidal flood (1%/0.5% AEP event) would affect about 160 properties, three sewage works, two schools, and three Scheduled Ancient Monuments, causing about £11M of damage. A 'do nothing' scenario would lead to 300 more properties at risk in 100 years, as well as two more schools and four more SAMs. it is worth noting that the policy unit is large in area and so the damage costs per unit area are low in comparison with the urban policy units. Being near to the city of Preston does indicate that some development might be expected in the future in parts of this policy unit. Also, the presence of high quality agricultural land in this policy unit will need suitable protection into the future. Managed coastal realignment and improved coastal sea defences to combat the significant future sea level increases predicted for this area are currently being put forward as possible future options for this policy unit, which fit with a P4 policy recommendation. There may be opportunities for some P6 policies (e.g. river restoration and floodplain reconnection), but only in localized areas between the Calder confluence and Samlesbury.

PART 2 – ACTIONS from CFMP Action Plan

The CFMP goes on from the above to attach a series of Actions to address the policy options chosen for each of the Ribble Valley related Policy Units mentioned above. These give some detail of the actions, indicators, timescales and partner organisations involved. These are described below:

"Guiding Principles' listed below are known as 'Outcomes' in the Environment Agency's *Creating A Better Place* document. Those below are all taken from the 'Reducing Flood Risk' section, except "work with water companies …", which comes from the "Ecological Health" section. All the Policy Sub Unit actions have Guiding Principles attached from them selected from the list below:

a) Prevent inappropriate development in the floodplain. Where development goes ahead it is resilient to flooding.
b) People at risk receive appropriate flood warnings and take action to protect themselves and their property.
c) More people are protected from flooding by more and better defences, where justified.
d) We will plan ahead for flood risk in all our work and adapt to change, including Climate Change.
e) Floods are managed as natural processes with new wetland habitats created where possible.
f) Work with water companies to develop and deliver affordable programmes to improve the water environment, including sustainable sewerage and drainage.

Also each Action has been assigned a priority grading: High being essential to achieve the policy aim and having a large effect; Medium being important to the policy aim and Low being desirable to the policy aim but giving the fewest benefits

1. Upper Ribble and Hodder

Preferred policy is to have no active intervention (including flood warning and maintenance), continue to monitor and advise.

Vision:

This very large policy unit (600km2) is predominantly rural, with only a few isolated flood risk areas/problems in villages such as Hellifield and Barnoldswick. For a flood with a 1 in 100 chance (1%), there are about 230 residential properties at risk (rising to 350 in 100 years), 1 hospital and 6 wastewates treatment works of flooding and overall economic damages would be approximately £18M.

- Flood risk will rise in rural areas.
- Possibilities exist for some more targeted 'natural' flood attenuation and flood storage functions to be enhanced in parts of this policy unit. However, these sites are well distributed and, as such, represent a very small area of the Policy Unit and are unlikely to have a significant effect on flood risk downstream, and so the dominant policy will still be P1 (no active intervention).
- This area does not have a significant sewer flooding (DG5) problem, although actual theoretical risk of such flooding is unclear

There are no flood warning areas in this policy unit

Action 1 (Medium Priority)

Guiding Principles - a, b, d

Actions and Success Criteria (in italics) **-**

Promote the application and use of flood resilience measures to those properties in the policy unit currently at risk of flooding, where flood defences are not economically viable. This should build on the experience of pilot schemes in the North West where grants have been provided to install flood-proof doors, hard flooring, and elevated power points, enabling residents to recover more quickly from a flood event. Consideration should also be given to the recommendations contained in the Pitt Review, and the potential options for funding such schemes.

Plan to promote flood resilience in the Policy Unit

Indicator - No. of properties installing flood resilience measures

Partners (lead in bold) – Local Authorities, Environment Agency

Timescale - 2012 – 2020 and ongoing

Action 2 (Low Priority)

Guiding Principles: d,e,f

Action and Success Criteria (in italics)

Promote land use / land management projects by landowners to benefit flood risk, via Higher Level Stewardship (HLS). This should target farmers and landowners in the policy unit with land suitable for use as floodplain restoration, wet grassland habitats, water meadows and hedgerow restoration, together with other habitats. The investigation should identify suitable sites whilst quantifying benefits for flood risk and the environment.

Scheme to promote HLS applications among landowners in the policy unit

Indicator – area of land in Higher Level Stewardship (HLS) agreements.

Partners (lead in bold) – **Environment Agency**, Natural England, RSPB, Landowners

2. Bowland Fell

Preferred policy is to take action with others to store water to manage run off in locations that provide overall flood risk reduction or environmental benefits, locally or elsewhere in the catchment.

Vision:

This policy unit (102km2) covers the area of the Bowland Fell SPA in the upper part of the River Hodder catchment. For a flood with a 1 in 100 chance (1%), there are only about 4 residential properties (staying at 4 in 100 years) at risk of flooding and overall economic damages would be very small.

- Flood risk will rise in most areas, but is likely to decrease in some localities due to the actions proposed.
- Possibilities exist for targeted 'natural' flood attenuation and flood storage functions to be enhanced in parts of this policy unit, including afforestation, changes to land management practices, and blocking of moorland drainage grips.
- This would also bring a number of other environmental benefits.
- The area does not have a significant sewer flooding (DG5) problem, although actual theoretical risk of such flooding is unclear.
- There are no flood warning areas in the policy unit.

Action 1. (Medium Priority)

Guiding Principles -. e

Action and Success Criteria (in italics)

Implement the Sustainable Catchment Management Programme (SCaMP) by United Utilities and its partners, to improve habitats within Bowland Fell. This will include the blocking of moorland drainage 'grips' in the Brennand and Whitendale catchments to attenuate flows and lead to re-wetting of moorland bog areas. It should also look to create small upland lakes, or 'scrapes', to provide habitat for wading birds and provide more storage in the upper catchment. Finally, woodland planting proposed under the SCaMP project may help to intercept flows and reduce run-off rates at a local level. It will be important to monitor the effects of SCaMP on run-off rates and downstream flooding. Academic staff at the Universities of Newcastle and Lancaster will carry out a range of flow monitoring over a 10 to 15 year period, to determine the level of these effects.

Implementation of the SCaMP project

Indicator - No. of SCaMP project objectives delivered

Partners (lead in bold) -United Utilities, Natural England, RSPB, University of Newcastle-Upon- Tyne, University of Lancaster

Timescale - 2005 – 2010 (with monitoring up to 2020)

Action 2 (Medium Priority)

Guiding Principles- d,e,f

Action and Success Criteria (in italics)

Promote land use / land management projects by landowners in selected areas to benefit flood risk, via Higher Level Stewardship (HLS). This action should focus on the area of Bowland Fell outside of United Utilities' ownership, to build on the work done by SCaMP by offering grants for wetland creation, floodplain restoration, and flood storage, thereby benefiting downstream flood risk. This will require negotiation with individual landowners and farmers to promote the benefits of HLS, and should also incorporate modelling based on the outcomes of SCaMP to predict the downstream benefits.

Strategy to promote HLS schemes among landowners in the Policy Unit

Indicator – Area of land in Higher Level Stewardship (HLS) agreements

Partners (lead in bold) –Environment Agency, Natural England, RSPB, Landowners

Timescale - 2010 – 2030 and ongoing

3. Clitheroe

Preferred policy is to take further action to reduce flood risk

Vision:

This very small urban policy unit (4km2) includes the main town of Clitheroe (pop. 14,000) within the Upper Ribble and Hodder catchment. For a flood with a 1 in 100 chance (1%), there are about 260 residential properties (rising to 490 in 100 years) at risk of flooding and overall economic damages would be approximately £38M. The main sources of flooding here are from the watercourses and from undercapacity/blockage of culverts. The Low Moor area of Clitheroe is at risk of flooding from the River Ribble, whereas other parts of Clitheroe are at risk of flooding from Mearley Brook. In addition, within Clitheroe there are about 37 properties at risk during much smaller (e.g. 1 in 10 year) flood events from Mearley Brook, which requires more urgent action.

- Flood risk in the town is high and will rise unacceptably if actions are not increased.
- Actions taken should not worsen flooding in built-up areas downstream of this policy unit
- A Strategic Flood Risk Assessment, produced by the Local Authorities, will steer development clear of existing and future floodplain and minimise flood risk to it.
- This area does not have a significant sewer flooding (DG5) problem, although actual theoretical risk of such flooding is unclear..
- This policy unit includes the Clitheroe and Low Moor flood warning areas.

Action 1 (High Priority)

Guiding Principles - c, d

Actions and Success Criteria (in italics)

Develop a strategy, subject to prioritisation and funding, to address flood risk within Clitheroe. This should incorporate a feasibility study, including modelling of the numbers of people and properties at risk in the towns, and a cost-benefit
analysis for the installation of new flood defences. Particular attention should be paid to culverted sections of Mearley Brook within the town, and the options available to reduce flood risk from this watercourse.

Completed Clitheroe Strategy

Indicator - Timetable and programme of actions available

Partners (lead in bold) – **Environment Agency**, Ribble Valley Borough Council
Lancashire County Council

Timescale – 2008 -2013 and ongoing

Action 2 (High Priority)

Guiding Principles – a,d

Action and Success Criteria (in italics)

Promote application of rigorous planning control for any new development on floodplains in and around Clitheroe using the principles of PPS25 and encourage the implementation of SuDS. Where development, exceptionally, take place in areas of flood risk, we will seek to ensure that floor levels are raised to an appropriate level, flood resilience is incorporated into buildings and it is demonstrated that safe access and evacuation can be provided during flood events.

Guiding statement to discourage development on floodplains and encourage the use of SuDs within new developments

Indicator – No of planning applications approved against Environment Agency advice

Partners (lead in bold) – **Ribble Valley Borough Council**, Environment Agency

Timescale – ongoing

Action 3 (Medium Priority)

Guiding principles – d

Action and Success Criteria (in italics)

Develop a System Asset Management Plan, utilising NFCDD, to schedule maintenance of existing flood defence assets within the policy unit to ensure that they meet their target asset condition and continue to protect against flooding. The plan should focus in particular on flood defences in Clitheroe, as well as assets of other organizations that can affect flood risk management

Maintenance plan for flood defences in the Policy unit.

Indicator – Number of flood defence assets identified for maintenance

Partners (lead in bold) – **Environment Agency,** United Utilities, Ribble Valley Borough Council, Landowners

Timescale – 2008 – 2010 and ongoing

Action 4 (Medium Priority)

Guiding Principles -a, d, f

Action and Success Criteria (in italics) **–**

Produce a Strategic Flood Risk Assessment (SFRA) for Clitheroe to help minimise flood risk to future development in the town from all sources. Exceptionally, where development is at risk appropriate flood mitigation measures will be implemented and residual risks fully considered.

SFRA recommendations implemented

Indicator - Average standard of protection for properties. Annual average damages

Partners (lead in bold) - **Ribble Valley Borough Council**, Environment Agency Lancashire County Council, United Utilities, Regional Assembly

Timescale - 2008-2013

Action 5 (Medium Priority)

Guiding Principles - b

Action and Success Criteria (in italics) **-**

Implement improvements in flood warning and flood response. This should focus on the promotion of the existing formal flood warning areas in Clitheroe and Low Moor, through the attendance of community meetings, press articles, and maildrops, highlighting the benefits of registering to receive the service. Consideration in the future should be given to the effects of climate change on river flows and flood maps with revisions to the area covered by the flood warning service if necessary.

Coverage target (number of properties at risk of flooding receiving flood warnings) met, coverage as a proportion of properties at risk in future does not reduce

Indicator -No. offered/receiving the warning service

Partners (lead in bold) –Environment Agency

Timescale –Ongoing

Action 6 (Medium Priority)

Guiding Principles -f

Action and Success Criteria (in italics) **-**

Investigate causes of surface water flooding and sewer flooding in Clitheroe and carry out remedial actions. This should include the dissemination of information by United Utilities and local councils relating to flood risk from their infrastructure, to enable targeted actions to be drawn up

Investigation into the causes of surface water and sewer flooding.

I**ndicator** - No. of properties with sewer flooding problems

Partners (lead in bold) -United Utilities, Local Authorities, County Councils, Highways Agency (see * Note below)

Timescale – 2012-2020 and ongoing

*Note: Following further consultation with Environment Agency and United utilities it has been established that in relation to this Action Lancashire County Council will be the Local Lead Flood Authority, supported by Ribble Valley Borough Council.

Action 7 (Medium Priority)

Guiding Principles - d, f

Action and Success Criteria (in italics) **–**

Identify structures which cause flow restrictions in Clitheroe, and prioritise structures for replacement / redesigning according to their flood risk. This activity should focus particularly on culverted watercourses within the town, as well as any bridges or channelised sections. Modelling should be carried out to determine the impact of these structures, to enable a prioritized list to be drawn up to aid in reducing flood risk in Settle.

Prioritised list of structures requiring replacement / redesigning

Indicator -Number of structures identified

Partners (lead in bold) - **Environment Agency**

Timescale - 2015-2025

Action 8 (Medium Priority)

Guiding Principles - d

Action and Success Criteria (in italics) -

Improve flood contingency planning in Clitheroe. This should focus on increasing the number of emergency plans for flood risk areas. It should also involve the formation of a local flood contingency planning group, incorporating the Environment Agency, emergency services, and local councils.

Increase in number of emergency plans available

Indicator - Emergency plans in place and current

Partners (lead in bold) –Environment Agency, Lancashire County Council, Ribble Valley Borough Council, United Utilities, British Waterways, Highways Agency

Timescale -2008-2020 and ongoing

4. Calder

Preferred option is to continue with existing or alternative actions to manage flood risk at the current level

Vision:

This large policy unit (280km2) is predominantly rural, with only a few isolated flood risk areas/problems in villages such as Trawden and Whalley. For a flood with a 1 in 100 chance (1%), there are about 410 residential properties (rising to 470 in 100 years), 1 emergency service building, , 1 electricity/gas station and 5 waste water treatment works at risk of flooding and overall economic damages would be approximately £22M. Whalley represents a small area of policy P5 in the much larger area of Policy P3, although it is not large enough to form a separate policy unit.

- Flood risk will rise in both rural and built-up areas.
- Actions taken must be carefully chosen to benefit and not worsen flooding in built-up areas downstream
- This policy unit does not have a significant sewer flooding (DG5) problem, although actual theoretical risk of such flooding is unclear.
- This policy unit includes the Whalley flood warning area.

Possibilities exist for more 'natural' flood attenuation and flood storage functions to be enhanced in some areas, including afforestation, changes to land management practices, blocking of moorland drainage grips and river restoration. These would also bring a number of other environmental benefits.

Action 1 (Medium Priority)

Guiding Principles - c, d

Action and Success Criteria (in italics)

Undertake a feasibility study to consider the justification for managing flood risk in Whalley and appropriate ways of doing this, accepting that major works are unlikely to be a priority for national funding in view of the existing standard of protection.
This study should build on previous modeling work done by the Environment Agency in the village, and cost small-scale improvements to flood defences as well as looking at the causes of surface water flooding.

Completed Whalley feasibility study

Indicator - Timetable and programme of actions available

Partners (lead in bold) – Environment Agency, Ribble Valley Borough Council, Lancashire County Council, United Utilities

Timescale - 2009-2015 and ongoing

Action 2 (Medium Priority)

Guiding Principle - d

Action and Success Criteria (in italics) **-**

Continue improvements in flood warning and flood response. This should focus on the promotion of a formal flood warning area of Whalley through the attendance of community meetings, press articles and maildrops highlighting the benefits of registering to receive the service. Consideration in the future should be given to the effects of climate change on river flows and flood maps with revisions to the area covered by the flood warning service if necessary**.**

Coverage target (number of properties at risk of flooding receiving flood warnings) met, coverage as a proportion of properties at risk in future does not reduce

Indicator - Number offered/receiving the warning service

Partners (lead in bold) - **Environment Agency,**

Timescale - Ongoing

Action 3 (Medium Priority)

Guiding Principles -d

Action and Success Criteria (in italics)**-**

Establish flood risk associated with canals through possible embankment breach or collapse of culverts beneath canals. Instigate Regional/Area liaison between EA and British Waterways to understand risk control measures in place and possible future actions.

Regular liaison established and appropriate actions taken such as mapping, sharing of maintenance programmes and emergency planning

Indicator – Number of embankment breaches modeled and culvert condition surveys completed

Partners (lead in bold) - **Environment Agency**, British Waterways

Timescale - 2008- 2013 and ongoing

Action 4 (Low Priority)

Guiding Principle – d,e,f

Action and Success Criteria (in italics) **–**

Promote land use / land management projects by land owners to benefit flood risk, via Higher Level Stewardship (HLS). This should target farmers and landowners in the policy unit with land suitable for use as wet grassland habitats, water meadows and hedgerow restoration, among other habitats. The strategy should identify suitable sites whilst quantifying benefits for flood risk and the environment. This study should focus on potential grip blocking South Pennine Moors SSI/SPA/SAC which could benefit downstream flood risk and potential sites lying adjacent to watercourses such as the River Calder, Sabden Brook and the River Ribble where land can be inundated to reduce flood risk to Preston and Walton-le-Dale.

Strategy to promote HLS schemes among landowners in the policy unit

Indicator -Number of appropriate Higher Level Stewardship (HLS) agreements

Partners (lead in bold) – **Environment Agency**, Natural England, RSPB, Landowners

Timescale - 2015-2025

5. <u>Lower Ribble</u>

Preferred policy is to take further action to sustain the current level of flood risk into the future (responding to the potential increases in risk from urban development, land use change and climate change)

Vision:

This large policy unit (144km2) is predominantly rural, with only a few isolated flood risk areas/problems in villages such as Ribchester. For a fluvial flood with a 1 in 100 chance (1%) and tidal flood with a 1 in 200 chance (0.5%), there are about 160 residential properties (rising to 460 in 100 years), 1 electricity /gas stations and 3 waste water treatment works at risk of flooding and overall economic damages would be approximately £11M.

- Flood risk will rise in both rural and built-up areas if actions are not increased.
- Actions taken must be carefully chosen to benefit and not worsen flooding in built-up areas downstream
- Possibilities exist for more ‘natural’ flood attenuation and flood storage functions to be enhanced in some areas, including managed coastal realignment, changes to land management practices and river restoration. These would also bring a number of other environmental benefits.
- This area does not have a significant sewer flooding (DG5) problem, although actual theoretical risk of such flooding remains unclear..
- This policy unit includes the Ribchester and Samlesbury Flood Warning Areas

Action 1 (High Priority)

Guiding Principles – c,d

Action and Success Criteria (in italics)**-**

Undertake a feasibility study to consider the justification for reducing flood risk further in Ribchester and appropriate ways of doing this, accepting that major works are unlikely to be a priority for national funding in view of the existing standard of protection. This study should incorporate modelling of the number of people and properties at risk in the village, Particular attention should be paid to the smaller watercourses such as Boyce's Brook and Duddel Brook, which converge at Ribchester.

Completed Ribchester feasibility study

Indicator - Timetable and programme of actions available

Partners (lead in bold) –Environment Agency, Ribble Valley Borough Council

Timescale - 2008 – 2013 and ongoing

Action 2 (Medium Priority)

Guiding Principle -d

Action and Success Criteria (in italics) -

Develop a System Asset Management Plan, utilising NFCDD, to schedule maintenance of existing flood defence assets within the policy unit, to ensure that they retain their standard of protection and so maintain flood risk at its current level.
This plan should focus on the tidal defences protecting Higher Penwortham on the River Ribble, as well as other defences in the policy unit.

Maintenance plan for flood defence assets in the Policy Unit

Indicator -Number of flood defence assets identified for maintenance

Partners (lead in bold) –Environment Agency

Timescale -2008-2013 and ongoing

Action 3 (Medium Priority)

Guiding Principles – b

Action and Success Criteria (in italics)

Continue improvements in flood warning and flood response. This should focus on the promotion of the existing formal flood warning areas in Ribchester and

Samlesbury with attendance of council and community meetings, and advertising in the local media to promote the flood warning service. Consideration in the future should be given to the effects of climate change on river flows and flood maps with revisions to the area covered by the flood warning service if necessary.

Coverage target (number of properties at risk of flooding receiving flood warnings) met, coverage as a proportion of properties at risk in future does not reduce.

Indicator – No offered/ receiving the warning service

Partners (lead in italics) – Environment Agency

Timescale - ongoing

Action 4 (Medium Priority)

Guiding Principle – d

Action and Success Criteria (in italics)

Establish flood risk associated with canals through possible embankment breach and collapse of culverts beneath canals. Instigate Regional/Area liaison with British Waterways to understand risk control measures in place and possible future actions

Regular liaison established and appropriate actions taken such as mapping, sharing of maintenance programmes and emergency planning

Indicator – Number of embankment breaches modeled and culvert condition surveys completed

Partners (lead in bold) – **Environment Agency**, British Waterways

Timescale – 2010 - 2020

Action 5 (Low Priority)

Guiding Principles -e

Action and Success Criteria (in italics)**-**

Produce a report looking at the impact of potential managed realignment schemes in the Ribble estuary on flood risk in the policy unit. The report should build on the experience gained during the construction of the Hesketh Outmarsh scheme on the south bank of the estuary, and the relationships that have developed with Natural England and RSPB during the course of that project. Potential sites should be included in the upcoming SMP2 for the Ribble Estauary from work done within the North area team and North West team within EA and approximate costings and flood risk benefits should be obtained for those sites using Hesketh Outmarsh as a benchmark. Managed re alignment brings the possibility of reducing the Flood Risk Management maintenance spend.

Report investigating managed realignment in the Ribble estuary

Indicator - Number of proposed realignment

Partners (lead in bold) –Environment Agency, Landowners

Timescale -2010-2025

Action 6 (Low Priority)

Guiding Principles – d,e,f

Action and Success Criteria (in italics) **–**

Promote land use/land management projects by land owners to benefit flood risk via Higher Level Stewardship (HLS). This should target farmers and landowners along the Ribble upstream of Preston with land suitable for use as wet grassland habitats, water meadows and hedgerow restoration among other habitats. The strategy should identify suitable sites while quantifying benefits for flood risk and the environment

Scheme to promote HLS applications among landowners in the policy area.

Indicators – area of land in appropriate Higher Level Stewardship (HLS) agreements

Partners (lead in bold) – Environment Agency, Natural England, RSPB, Landowners

Timescale - 2008 - 2020

Action 7 (Low Priority)

Guiding Principles- e

Action and Success Criteria (in italics) **–**

Complete a feasibility study of suitable sites in the policy unit for floodplain / river restoration and habitat creation, providing flood risk benefits through flow attenuation. This study should focus on potential sites lying adjacent to the River Ribble floodplain where land can be inundated to reduce flood risk to Preston, Walton-le-Dale and other small villages.

Feasibility study to investigate river / floodplain restoration and habitat creation

Indicators - Number of potential restoration sites investigated

Partners (lead in bold) – Environment Agency, Defra, Natural England, Landowners

Timescale - 2008-2020

Appendix 5 – Impounding Reservoirs in Ribble Valley Borough Council Area

Facility	OS Grid Ref
Alston 1	SD 6104436060
Alston 2	SD 6029836176
Dilworth Parsonage	SD 6150738253
Spademill No 1	SD 6985931883
Spademill No 2	SD 6156537338
Stocks	SD 7185554584

Appendix 6 - RFRA Appendix 2 Tables 1 to 5

1 The RFRA contains an assessment by the Environment Agency of the potential risk to each North West Local Authority from river and coastal flooding. It is based on existing flood risk data held by the Agency, which was combined with information on future housing development contained in the draft (January 2006) RSS. This exercise produced a ranking of local planning authorities (excluding the three shire counties) in the region in terms of the relative potential relationship between their flood risk and housing development. It has been updated to reflect the recommendations on housing allocations and previously developed land targets set out in the Proposed Changes to the RSS (March 2008), and the release of new Land Use Change Statistics issued by DCLG in October 2007.

2 Section 4 of the RFRA contains a summary of the overall ranking generated as a result of the Environment Agency's work. Also RFRA Appendix 2 contains the full set of tables giving further detail of the relationship of flooding to current developed areas and future development. They are briefly described below together with their implications for Ribble Valley. The full tables are available in Appendix 7 of this document.

RFRA Appendix 2 can be found on the following link:

http://www.nwrpb.org.uk/downloads/documents/oct_08/nwra_1225454203_Appendix_2_-_North_West_RSS_-_.xls

3 RFRA Appendix 2 Table 1 outlines the total number of properties in both Flood Zones 3 and 2 for each Local Authority and ranks each authority by the number of its current properties within EA Flood Zone 3. 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.

4 In the RVBC area there are 829 or 3.2% of properties lying within Flood Zone 3 ranking RVBC 19th out of 44 authorities (with rank1 being that authority with the highest percentage of properties within the zone and rank 44 having the lowest)

5 Table 2 (see Tables below) 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 EA defined flood 'cell' divided by the standard of protection from flooding provided by any flood defence structures 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 in the RFRA 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.

6 RVBC has a theoretical risk of an average of 106 properties flooding per year, placing it in category 3 at a high risk. However it should be noted that 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 data for the standard of protection against flooding. Tables 1 and 2 are, therefore, not directly comparable, but the data in each is the most reliable for ranking purposes.

7 Tables 3 and 4 address development pressure and flood risk. Table 3 calculates the amount of brownfield land each authority would need to develop to both deliver its housing allocation for the period 2003 – 2021 at the required densities and also maintain the required brownfield target. In Ribble Valley's case this requires the authority to supply 2900 units at 30 units per hectare giving a total land requirement of 96.67 ha. The Ribble Valley RSS brownfield target is to place at least 65% of these units on brownfield land, which equates to 62.83ha (65% of 96.67ha)

8 Table 4 presents, for each local authority area, that part of its urban area that lies within Flood Zone 3 (urban is defined here as the built up parts of the Borough, both in towns, villages and smaller settlements) and the remainder lying in non urban areas. It then calculates what proportion of this remaining non- Flood Zone 3 urban land is represented by the required brownfield land take, assuming that the majority of developable brownfield will be found in urban areas. Authorities are then ranked in terms of the "development pressure" this calculation reveals. In this context development pressure relates directly to the increasing percentage of the urban area that is represented by the necessary brownfield. Greenfield land is ignored for the purposes of this calculation as more of such land is thought to be available outside floodplain areas.

9 In Ribble Valley's case this calculation gives a low development pressure indicator (rank 2 out of ranks 1 to 5, 5 being the most pressured). In detail this is derived from comparing the 63ha from Table 3 as a percentage of 2308ha within the borough which is urban but outside Flood Zone 3. This indicates

that there is some potential to find land for necessary development outside flood prone areas (see 5.14 bullet 3)

10 Table 5 combines the rankings in Tables 2 & 4 to present the overall ranking for each local authority. In this calculation Ribble Valley is given an overall rank of 6 within a ranking scheme of 1 to 15 with 15 being the highest risk and 1 being the lowest.

11 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). Ribble Valley BC has a low ranking here

- A high position in Table 2 denotes high current flood risk (either large numbers, or low standard of protection, or both). Ribble Valley BC has a high ranking here

- A high position in Tables 3 & 4 denotes development pressure and the potential for each local authority to possibly accommodate new development in urban areas outside flood risk areas, but without any other planning constraints taken into account. Ribble Valley BC has a low development pressure ranking.

- 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. Ribble Valley BC rates in the middle to lower risk end of the spectrum.

RFRA Tables 1 to 5

Table 1 - LPAs Ranked by Number of Existing Properties in Flood Zone 3

Local Planning Authority Ranked by Flood Zone 3	Property Count				
	Flood Zone 3	Flood Zone 2 & 3	Flood Zone 1	Total	% of props in Flood Zone 3
Wyre	24132	29147	21113	50260	48.0
Lancaster	14781	16792	44689	61481	24.0
Warrington	12569	19532	69288	88820	14.2
Manchester	10499	16319	195663	211982	5.0
Salford	10233	12477	96055	108532	9.4
Blackpool	9524	11203	58394	69597	13.7
Wirral	6653	8053	135733	143786	4.6
Sefton	4093	6915	119928	126843	3.2
Wigan	3888	7915	132917	140832	2.8
Carlisle	3706	5415	45471	50886	7.3
Stockport	3399	4456	126614	131070	2.6
Preston	2723	3905	58684	62589	4.4
West Lancashire	2376	2701	46283	48984	4.9
Liverpool	2333	4918	203904	208822	1.1
Barrow-in-Furness	2331	3338	30921	34259	6.8
LDNP	2219	3188	19332	24739	9.0
Rochdale	2093	3523	90966	94489	2.2
St. Helens	1788	3297	77276	80573	2.2
Fylde	1708	2223	33985	36208	4.7
South Lakeland outside LDNP	1507	2601	38458	40027	3.8
South Ribble	1494	2835	45550	48385	3.1
Allerdale outside LDNP	1364	3147	38924	41257	3.3
Pendle	1345	1732	40024	41756	3.2
Burnley	1289	1679	40860	42539	3.0
Chester	1281	2041	56484	58525	2.2
Rossendale	1249	2172	29795	31967	3.9
Copeland outside LDNP	1171	2254	29536	31539	3.7
Bolton	947	1450	120911	122361	0.8
Ribble Valley	829	1353	24285	25638	3.2
Eden outside LDNP	808	1909	22001	23788	3.4
Chorley	768	951	45290	46241	1.7
Trafford	762	2577	98381	100958	0.8
Crewe and Nantwich	637	848	52310	53158	1.2
Tameside	631	1075	100299	101374	0.6
Blackburn with Darwen	609	2507	60191	62698	1.0
Hyndburn	594	746	37467	38213	1.6
Macclesfield	545	1367	73371	74738	0.7
Oldham	485	1038	97486	98524	0.5
Vale Royal	446	1543	55342	56885	0.8
Halton	385	633	54823	55456	0.7
Bury	288	5036	78966	84002	0.3
Knowsley	263	557	64922	65479	0.4
Congleton	256	508	41997	42505	0.6
Ellesmere Port and Neston	232	287	28968	29255	0.8
Derbyshire Dales*	147	182	3044	3226	

Table 2 – LPAs Ranked by the Average Number of Properties at Risk of Flooding per Year

Local Planning Authority	Properties with a Standard of Protection of 1 in 101- 1000 years	Properties with a Standard of Protection of 1 in 1- 100 years	Total Properties at Flood Risk	Theoretical Property Risk (Number of properties flooding per year)	Flood Risk (FR) Rank
Wyre	10	31,107	31,117	481.38	3
Sefton	3,019	14,759	17,778	313.65	3
Manchester	0	3,967	3,967	159.75	3
Lancaster	82	5,734	5,816	112.62	3
Ribble Valley	0	1,476	1,476	105.73	3
Warrington	847	4,892	5,739	91.77	3
Salford	0	6,450	6,450	87.18	3
West Lancashire	0	3,739	3,739	68.45	2
Wigan	0	3,095	3,095	65.61	2
Preston	0	2,977	2,977	60.02	2
South Lakeland outside LDNP	425	1,998	2,496	53.49	2
Carlisle	16	3,685	3,701	53.37	2
Blackpool	0	5,061	5,061	50.75	2
Trafford	0	1,122	1,122	45.37	2
Wirral	3,714	2,948	6,662	45.24	2
Fylde	507	2,261	2,768	44.37	2
Copeland outside LDNP	1,411	989	2,816	43.66	2
Rossendale	0	351	351	43.50	2
Pendle	0	1,006	1,006	39.54	2
LDNP	8	1,896	1,904	36.81	2
Chorley	9	843	852	35.51	2
Barrow-in-Furness	3,859	626	4,485	32.91	2
Allerdale outside LDNP	0	2,113	2,113	32.76	2
Burnley	0	1,258	1,258	31.45	2
South Ribble	0	1,672	1,672	27.08	2
Blackburn with Darwen	0	908	908	26.42	2
Eden outside LDNP	0	692	692	23.25	2
Stockport	0	641	641	19.20	2
Chester	760	1,281	2,041	19.06	2
Halton	0	789	789	18.97	2
Vale Royal	286	809	1,095	14.44	2
Oldham	0	248	248	13.59	2
St. Helens	0	722	722	11.81	2
Rochdale	0	676	676	10.43	2
Bolton	0	291	291	8.54	1
Macclesfield	0	477	477	7.08	1
Bury	0	200	200	4.59	1
Hyndburn	0	183	183	4.58	1
Congleton	0	179	179	4.52	1
Knowsley	0	53	53	2.05	1
Liverpool	0	93	93	1.16	1
Crewe and Nantwich	0	46	46	0.90	1
Tameside	0	30	30	0.41	1
Ellesmere Port and Neston	46	3	49	0.34	1
Total	**14,953**	**115,124**	**129,010**	**2,386**	

Extract from Table 2B of RFRA Appendix 2
Supporting Property Risk Information for Lancashire Local Authorities

Note: Figures attached to each Local Authority refer to the average number of properties which would be expected to flood each year. (See also 5.14 bullet 2)

Flood return	Ribble Valley	Blackburn w Darwen	Blackpool	Burnley	Chorley	Fylde	Hyndburn	Lancaster	Pendle	Preston	Rossendale	S. Ribble	West Lancashire	Wyre
1														
2														
5								1.20			27.20			
10	89.4					0.60					8.30			1.10
15											5.93			
17														
20	6.20				31.35			11.20	38.88	1.95	2.00			32.70
25	0.44	2.08								0.04	0.04	0.60		176.32
30														
35		24.23			0.17			63.54					1.37	
40	7.70			31.45	1.15	0.03	4.58	1.15					6.43	17.78
45										9.09				
50					1.52	34.90		0.82	0.62	45.70		11.88	44.34	
55														
60					0.02			1.15						
65														
70	1.99	0.11	0.46		1.24	1.24		4.99	0.04		0.03	6.47	1.23	0.63
75										3.24		8.13	15.08	
80								1.45						
90														
100			50.29			4.22		26.59						252.79
150					0.06	3.38		0.53						0.07
200														
220														
510														
1000														

Table 3 – LPAs Ranked by Housing Allocation Including Housing Densities and Taking into Account Brownfield Land Development Targets

Local Planning Authority	Total Housing Provision (2003-2021)	Housing Density (props per hectare)	Development Area Required (Hectares)	Brownfield Development Target (%)	Housing Area to use Brownfield Land (Hectares)	LPA Area (Hectares)
Manchester	63000	94	670.21	90	603.19	11565
Liverpool	35100	77	455.84	90	410.26	13354
Wigan	17600	39	451.28	80	361.03	18819
Salford	28800	85	338.82	90	304.94	9719
Vale Royal	9000	30	300.00	80	240.00	38331
Tameside	13500	48	281.25	80	225.00	10319
Chester	7500	30	250.00	80	200.00	44833
Trafford	10400	43	241.86	80	193.49	10603
Macclesfield	7200	30	240.00	80	192.00	52498
Bolton	10400	44	236.36	80	189.09	13980
Ellesmere Port and Neston	7200	31	232.26	80	185.81	10953
Wirral	9000	39	230.77	80	184.62	25640
St. Helens	10260	37	277.30	65	180.24	13639
Chorley	7500	30	250.00	70	175.00	20291
South Ribble	7500	30	250.00	70	175.00	11461
Blackburn with Darwen	8800	34	258.82	65	168.24	13701
Bury	9000	43	209.30	80	167.44	9948
Halton	9000	35	257.14	65	167.14	9033
Stockport	8100	39	207.69	80	166.15	12605
Sefton	9000	36	250.00	65	162.50	20477
Crewe and Nantwich	8100	30	270.00	60	162.00	43041
Rochdale	7200	36	200.00	80	160.00	15808
Lancaster	7200	32	225.00	70	157.50	65468
Warrington	6840	35	195.43	80	156.34	18237
Knowsley	8100	36	225.00	65	146.25	8647
Preston	9120	44	207.27	70	145.09	14294
Congleton	5400	30	180.00	80	144.00	21099
Carlisle	8100	30	270.00	50	135.00	105560
Blackpool	8000	43	186.05	65	120.93	4318
South Lakeland outside LDNP	7200	30	240.00	50	120.00	174294
Fylde	5500	30	183.33	65	119.17	18263
West Lancashire	5400	30	180.00	65	117.00	38110
Oldham	5200	44	118.18	80	94.55	14235
Rossendale	4000	32	125.00	65	81.25	13805
Allerdale outside LDNP	4800	30	160.00	50	80.00	132352
Pendle	3420	30	114.00	65	74.10	16936
Barrow-in-Furness	2700	30	90.00	80	72.00	13206
Eden outside LDNP	4300	30	143.33	50	71.67	215645
Hyndburn	3400	31	109.68	65	71.29	7299
Copeland outside LDNP	4140	30	138.00	50	69.00	77554
Wyre	3700	38	97.37	65	63.29	32901
Ribble Valley	2900	30	96.67	65	62.83	58447
Burnley	2340	38	61.58	65	40.03	11070
LDNP	1080	30	36.00	50	18.00	229200

Table 4 Future Flood Risk

Local Planning Authority	Total Local Authority Area (Hectares)	Flood Zone 3 in Local Authority Area (Hectares)	Flood Zone 3 in Urban Area within LA Area (Hectares)	Urban Area within LA Area (Hectares)	Housing Area to use brownfield land (Hectares)	Urban Area Outside Floodplain (Urban Area - FZ3 within Urban Area) (Hectares)	Percentage of land available (Housing Area to use brownfield land/Urban Area Outside Floodplain)*100	Development Pressure Rank
Ellesmere Port and Neston	10917	2258	333	2911	186	2578	7.21	5
South Ribble	11424	1635	87	2530	175	2443	7.16	5
Chorley	20224	1763	66	2520	175	2454	7.13	5
Salford	9688	802	402	4764	305	4361	6.99	5
Manchester	11528	914	523	9159	603	8636	6.98	5
Blackburn with Darwen	13656	358	74	2738	168	2664	6.32	4
Wigan	18758	908	263	6095	361	5832	6.19	4
Blackpool	4303	981	367	2419	121	2052	5.89	4
Fylde	18201	2981	115	2152	119	2037	5.85	4
Vale Royal	38209	2150	92	4407	240	4315	5.56	4
Tameside	10286	277	109	4358	225	4249	5.30	4
Halton	9004	642	150	3418	167	3268	5.11	4
Preston	14247	1023	174	3027	145	2853	5.09	4
Barrow-in-Furness	13160	4257	173	1591	72	1418	5.08	4
Bury	9916	299	76	3472	167	3396	4.93	4
Liverpool	13311	261	103	8545	410	8442	4.86	4
Hyndburn	7275	239	76	1575	71	1499	4.76	4
Lancaster	65247	9575	894	4227	158	3333	4.73	4
Congleton	21033	736	52	3231	144	3179	4.53	4
Rossendale	13760	260	76	1960	81	1884	4.31	3
Chester	44689	3412	263	5136	200	4873	4.10	3
Wyre	32790	7267	1113	2692	63	1579	4.01	3
Crewe and Nantwich	42906	1893	144	4260	162	4116	3.94	3
Bolton	13935	290	57	4943	189	4886	3.87	3
Warrington	18178	2522	892	5007	156	4114	3.80	3
Pendle	16881	443	103	2085	74	1982	3.74	3
Rochdale	15757	529	168	4489	160	4321	3.70	3
Trafford	10570	936	90	5436	193	5346	3.62	3
Knowsley	8619	305	73	4137	146	4064	3.60	3
Carlisle	105180	9754	296	4075	135	3779	3.57	3
Macclesfield	52332	1513	97	5806	192	5709	3.36	3
West Lancashire	37984	8997	248	3884	117	3637	3.22	3
South Lakeland outside LDNP	97285	7758	289	4219	120	3929	3.05	3
Copeland outside LDNP	26710	3009	150	2447	69	2297	3.00	3
Stockport	12565	756	266	6328	166	6062	2.74	2
Ribble Valley	58253	2542	130	2438	63	2308	2.72	2
St. Helens	13594	477	354	6997	180	6643	2.71	2
Sefton	20409	3822	172	6203	163	6031	2.69	2
Wirral	25556	1739	500	8006	185	7507	2.46	2
Burnley	11034	397	101	1748	40	1647	2.43	2
Oldham	14189	266	49	4303	95	4253	2.22	2
Allerdale outside LDNP	76609	9552	233	4047	80	3814	2.10	2
Eden outside LDNP	169797	5975	202	3703	72	3501	2.05	2
LDNP	227327	18174	466	4408	18	3942	0.46	1

Table 5 RFRA Flood Risk Summary Table

Local Planning Authority	Property Risk	Flood Risk Category	Flood Risk Number	Housing Allocation	Housing Density (props per hectare)	Housing Area to use brownfield land (Ha)	Brownfield Land required as a percentage of urban area outside FZ3 (%)	Development Pressure Rank	Overall Risk Rank
Salford	87.18	High	3	28800	85	304.94	6.99	5	15
Manchester	159.75	High	3	63000	94	603.19	6.98	5	15
Lancaster	112.62	High	3	7200	32	157.50	4.73	4	12
South Ribble	27.08	Medium	2	7500	30	175.00	7.16	5	10
Chorley	35.51	Medium	2	7500	30	175.00	7.13	5	10
Wyre	481.38	High	3	3700	38	63.29	4.01	3	9
Warrington	91.77	High	3	6840	35	156.34	3.80	3	9
Blackpool	50.75	Medium	2	8000	43	120.93	5.89	4	8
Wigan	65.61	Medium	2	17600	39	361.03	6.19	4	8
Preston	60.02	Medium	2	9120	44	145.09	5.09	4	8
Blackburn with Darwen	26.42	Medium	2	8800	34	168.24	6.32	4	8
Halton	18.97	Medium	2	9000	35	167.14	5.11	4	8
Fylde	44.37	Medium	2	5500	30	119.17	5.85	4	8
Vale Royal	14.44	Medium	2	9000	30	240.00	5.56	4	8
Barrow-in-Furness	32.91	Medium	2	2700	30	72.00	5.08	4	8
Rossendale	43.50	Medium	2	4000	32	81.25	4.31	3	6
Chester	19.06	Medium	2	7500	30	200.00	4.10	3	6
Sefton	313.65	High	3	9000	36	162.50	2.69	2	6
Pendle	39.54	Medium	2	3420	30	74.10	3.74	3	6
Rochdale	10.43	Medium	2	7200	36	160.00	3.70	3	6
Trafford	45.37	Medium	2	10400	43	193.49	3.62	3	6
Copeland outside LDNP	43.66	Medium	2	4140	30	69.00	3.00	3	6
West Lancashire	68.45	Medium	2	5400	30	117.00	3.22	3	6
Carlisle	53.37	Medium	2	8100	30	135.00	3.57	3	6
South Lakeland outside L	53.49	Medium	2	7200	30	120.00	3.05	3	6
Ribble Valley	105.73	High	3	2900	30	62.83	2.72	2	6
Ellesmere Port and Neste	0.34	Low	1	7200	31	185.81	7.21	5	5
St. Helens	11.81	Medium	2	10260	37	180.24	2.71	2	4
Oldham	13.59	Medium	2	5200	44	94.55	2.22	2	4
Burnley	31.45	Medium	2	2340	38	40.03	2.43	2	4
Liverpool	1.16	Low	1	35100	77	410.26	4.86	4	4
Tameside	0.41	Low	1	13500	48	225.00	5.30	4	4
Stockport	19.20	Medium	2	8100	39	166.15	2.74	2	4
Wirral	45.49	Medium	2	9000	39	184.62	2.46	2	4
Bury	4.09	Low	1	9000	43	167.44	4.93	4	4
Congleton	4.52	Low	1	5400	30	144.00	4.53	4	4
Hyndburn	4.58	Low	1	3400	31	71.29	4.76	4	4
Allerdale outside LDNP	32.76	Medium	2	4800	30	80.00	2.10	2	4
Eden outside LDNP	23.25	Medium	2	4050	30	71.67	2.05	2	4
Knowsley	2.05	Low	1	8100	36	146.25	3.60	3	3
Bolton	7.04	Low	1	10400	44	189.09	3.87	3	3
Crewe and Nantwich	0.90	Low	1	8100	30	162.00	3.94	3	3
Macclesfield	7	Low	1	7200	30	192	3	3	3
LDNP	36.81	Medium	2	2100	30	18.00	0.46	1	2