Ribble Valley Borough Council

Ribble Valley Borough Council
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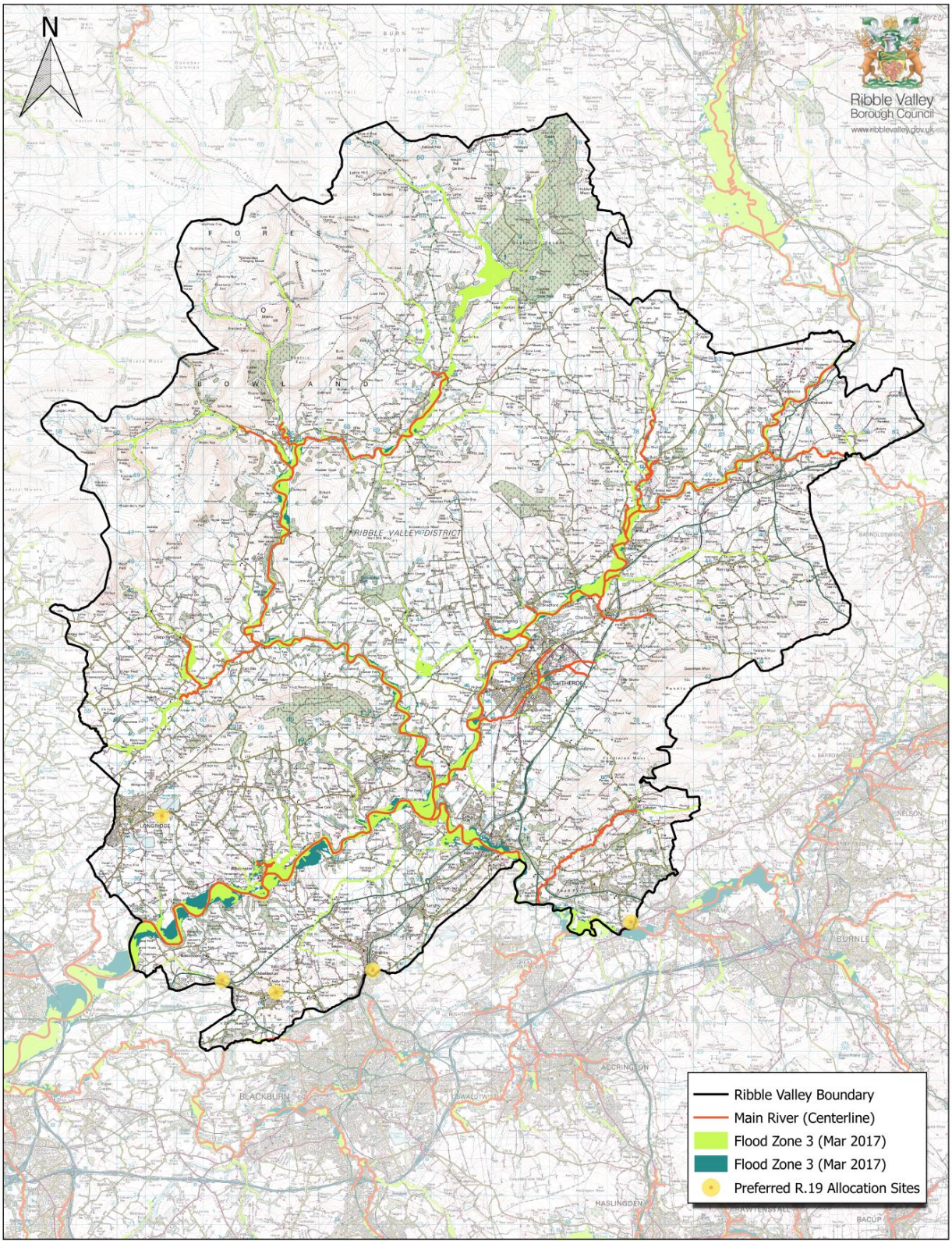
Strategic Flood Risk Assessment
-Level One-

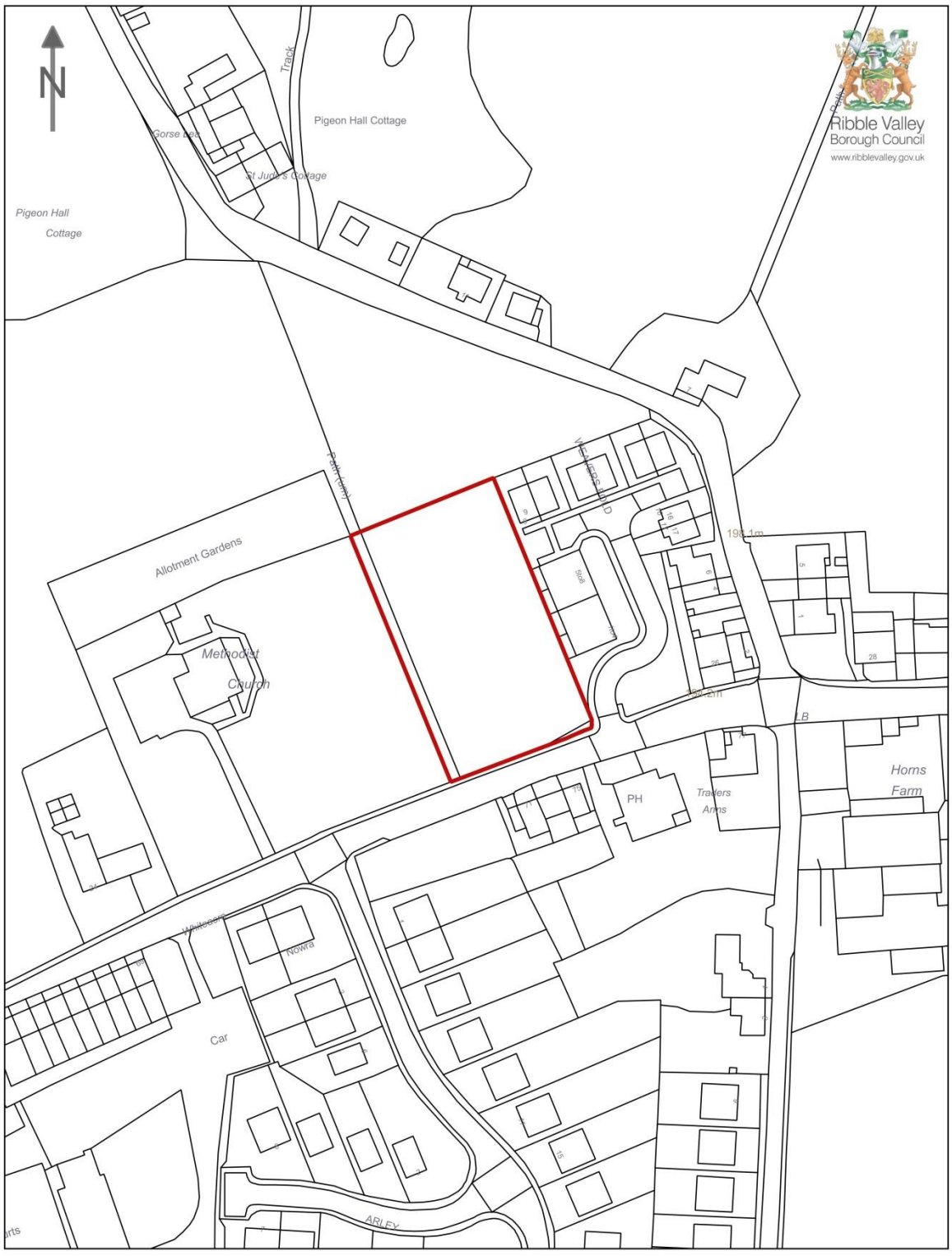
REVISED LEVEL ONE ASSESSMENT

APRIL 2017



Ribble Valley Strategic Flood Risk Assessment (Level 1)

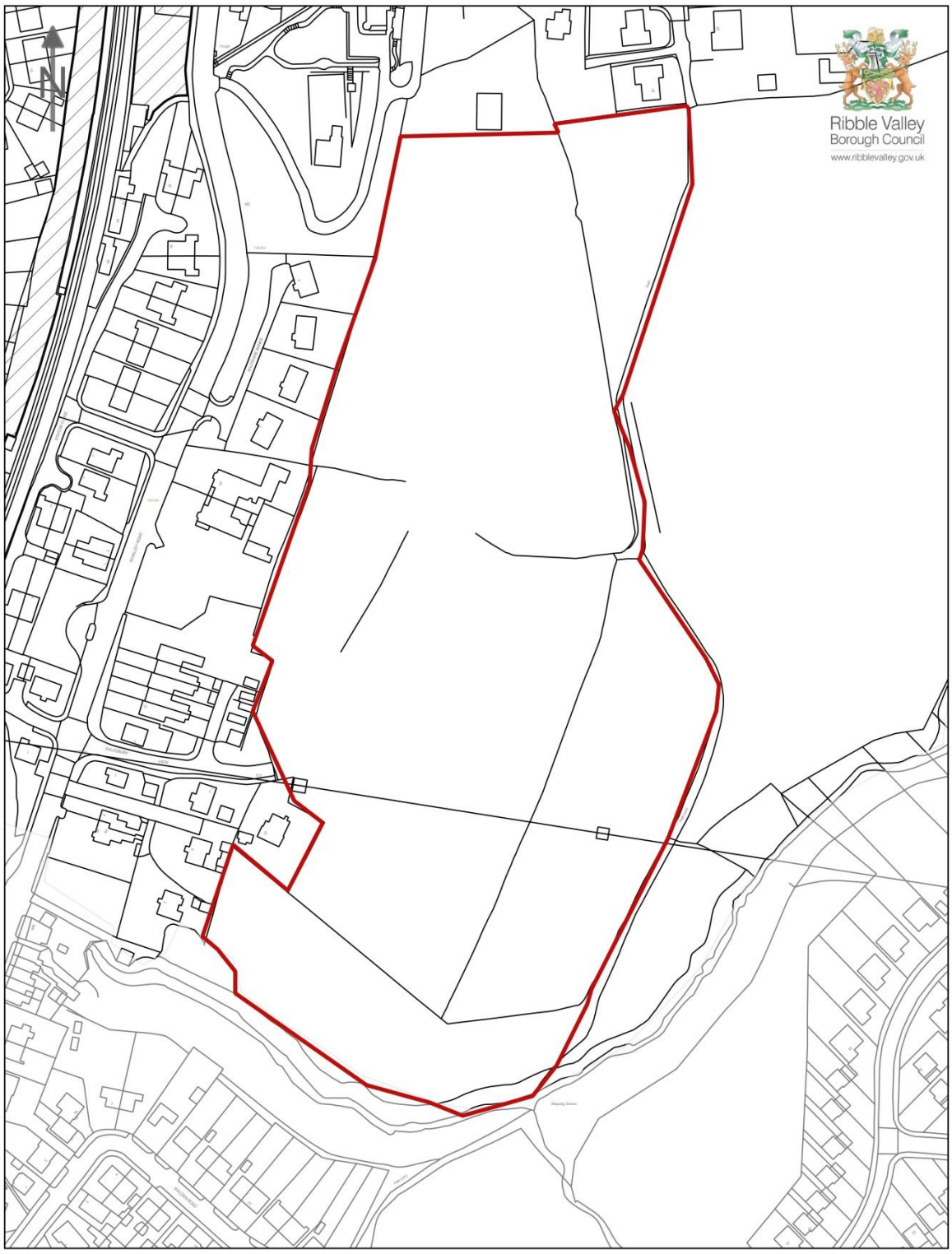
Scale: 1:115,000
Date: 25 Apr 2017



Housing and Economic Development DPD Policy HAL1: Land at Mellor Lane

Scale: 1:1,250

Date: 25 Apr 2017



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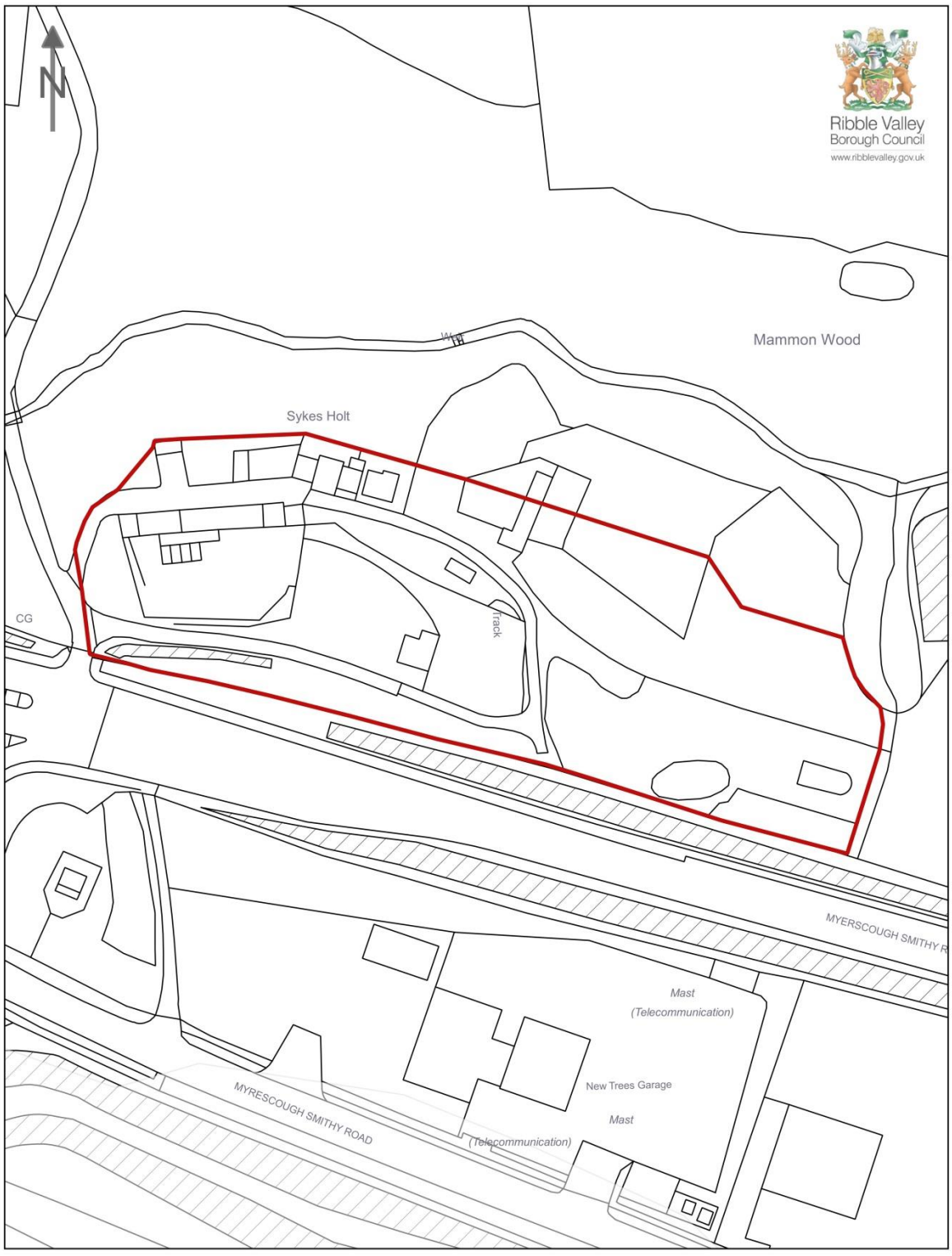
Scale: 1:2,000

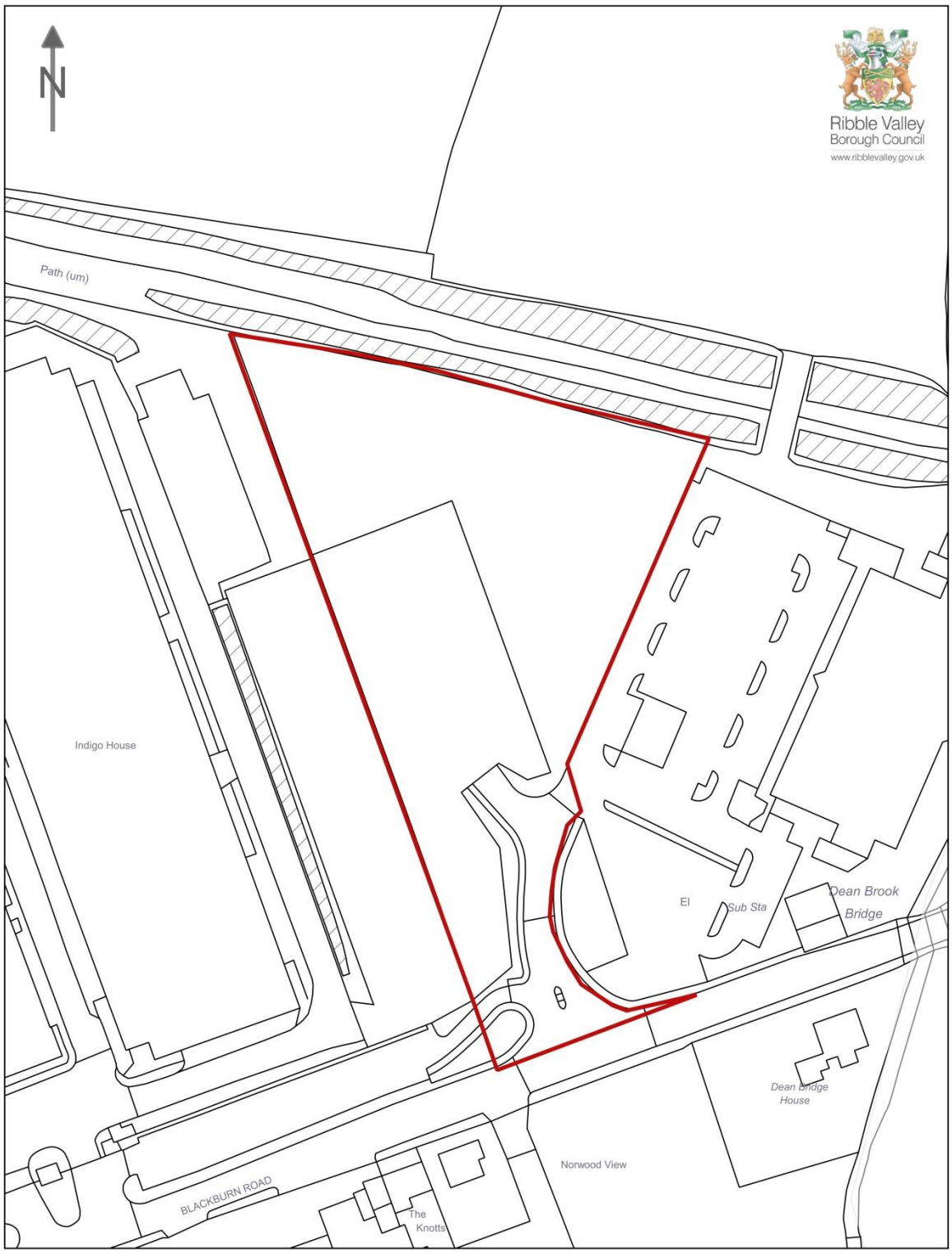
Date: 25 Apr 2017



Housing and Economic Development DPD Policy EAL1: Land at Sykes Holt, Mellor

Scale: 1:1,250

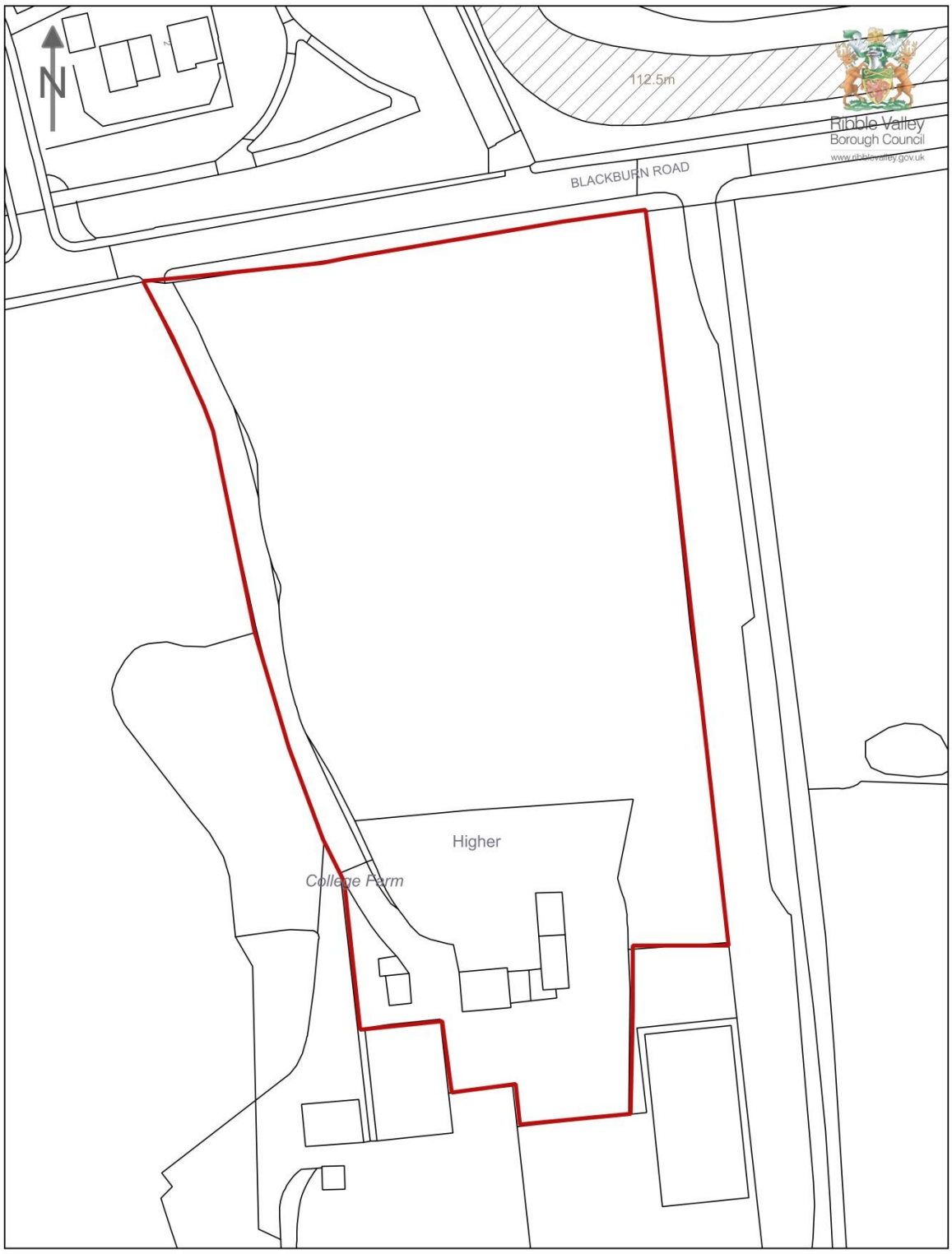
Date: 25 Apr 2017



Housing and Economic Development DPD Policy EAL2: Land at Time Technology Park, Simonstone

Scale: 1:1,250

Date: 25 Apr 2017



Housing and Economic Development DPD Policy EAL3: Land at Higher Cottage Farm, Longridge

Scale: 1:1,000

Date: 25 Apr 2017

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 as it relates to Ribble Valley.

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, Lancashire County Council and United Utilities, that will affect the Borough in the near, medium and long terms. It deals in some detail with the most important national land use planning policy document, Planning Policy Guidance (PPG) – Flood Risk and Coastal Change. It also brings together a variety of other flood related information and forms a part of the evidence lying behind future flood risk policy in the Borough within the Adopted Core Strategy of 2014 and also the accompanying allocations DPD the Housing and Economic Development DPD (HEDPD) which is currently (April 2017) being progressed. These 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 Exception 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 (DPDs) 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 Lancashire County Council, 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 was originally considered that a Level 1 SFRA was appropriate for Ribble Valley in 2010. This Level 1 SFRA has been updated to take into account any changes that have subsequently been made.

Need for a Level 2 SFRA.

After consultation with the Environment Agency and the Lead Local Flood Authority (Lancashire County Council) it was considered that, given the specific locations of the allocations proposed within the Housing and Economic Development DPD, a Level 2 SFRA is not required at this stage.

Contents

RIBBLE VALLEY Level 1 STRATEGIC FLOOD RISK ASSESSMENT (SFRA)

April 2017

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 Guidance (PPG) Flood Risk and Coastal Change 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 of Local Plans 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.

1.3 **General scope**

Managing flood risks: who is responsible (from Planning Practice Guidance (PPG))

Defra has overall national responsibility for policy on flood and coastal erosion risk management, and provides funding for flood risk management authorities through grants to the Environment Agency and local authorities.

A. The Environment Agency

The Environment Agency is responsible for taking a strategic overview of the management of all sources of flooding and coastal erosion. This includes, for example, setting the direction for managing the risks through strategic plans; providing evidence and advice to inform Government policy and support others; working collaboratively to support the development of risk management skills and capacity; and providing a framework to support local delivery. The Agency also has operational responsibility for managing the risk of flooding from main rivers, reservoirs, estuaries and the sea, as well as being a coastal erosion risk management authority. As part of its strategic overview role, the Environment Agency has published a National Flood and Coastal Risk management Strategy for England. This strategy provides a lot more information designed to ensure that the roles of all those involved in managing risk are clearly defined and understood.

B. Lead Local Flood Authorities

Lead Local Flood Authorities (unitary authorities or county councils, in this area Lancashire County Council) are responsible for developing, maintaining and applying a strategy for local flood risk management in their areas and for maintaining a register of flood risk assets. They

also have lead responsibility for managing the risk of flooding from surface water, groundwater and ordinary watercourses. The LLFA is a statutory consultee in the planning process for major development proposals as they are defined in Part 1 (2) of the Town and Country Planning (Development Management Procedure) (England) Order 2012, which have surface water implications, as of April 2015.

C. District Councils

District Councils such as Ribble Valley Borough Council are key partners in planning local flood risk management and can carry out flood risk management works on minor watercourses, working with Lead Local Flood Authorities and others, including through taking decisions on development in their area which ensure that risks are effectively managed.

D. Internal Drainage Boards

Internal Drainage Boards, which are independent public bodies responsible for water level management in low lying areas, also play an important role in the areas they cover (approximately 10% of England at present), working in partnership with other authorities to actively manage and reduce the risk of flooding.

E. Highway Authorities

Highway Authorities are responsible for providing and managing highway drainage and roadside ditches, and must ensure that road projects do not increase flood risk. In Ribble Valley's case the Highway Authority is Lancashire County Council

F. Water and Sewerage Companies

Water and Sewerage Companies are responsible for managing the risks of flooding from water and foul or combined sewer systems providing drainage from buildings and yards. In Ribble Valley's area water supply and sewerage is carried out by United Utilities.

G. Duty to co-operate

Under the Flood and Water Management Act 2010 all risk management authorities mentioned above have a duty to co-operate with each other and to share data.

H. Regional Flood and Coastal Committees

Eleven Regional Flood and Coastal Committees have been established in England. These are responsible for ensuring coherent plans are in place for identifying, communicating and managing flood and coastal erosion risks across catchments and shorelines; for promoting efficient, targeted investment in flood and coastal erosion risk management; and for providing a link between flood risk management authorities and other relevant bodies to develop mutual understanding of flood and coastal erosion risks in their areas.

I. Department of Communities and Local Government

Department of Communities and Local Government (DCLG) through Local Planning Authorities have a key role in the planning process to ensure flood risk is appropriately taken into account in the planning process. The policy on how to take flood risk into account can be found in the National Planning Policy Framework (NPPF). DCLG are also responsible for Building Regulations.

1.4 Planning Policy Guidance (PPG) – Flood Risk and Coastal Change section 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), Lancashire County Council as the Lead Local Flood Authority (LLFA), sewerage undertakers, highway authorities and various sections of the Local Authority itself. This document comprises the Level 1 SFRA for the Ribble Valley Borough Council's area.

1.5 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 PPG.

1.6 The SFRA will inform the selection of allocation of land for development in the developing Housing and Economic Development DPD (HEDPD).

Role of SFRA in Planning for Housing

1.7 The SFRA should inform the thinking behind the options for the allocation of land for housing development through its input into flood related aspects the Strategic Housing Land Availability Assessment or SHLAA, which helps LPAs assess the potential suitability of broad and site specific locations across a wide variety of factors 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 (Diagram 2 within PPG Flood Risk and Coastal Change section 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);
- 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 Lancashire County Council as the LLFA, 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:

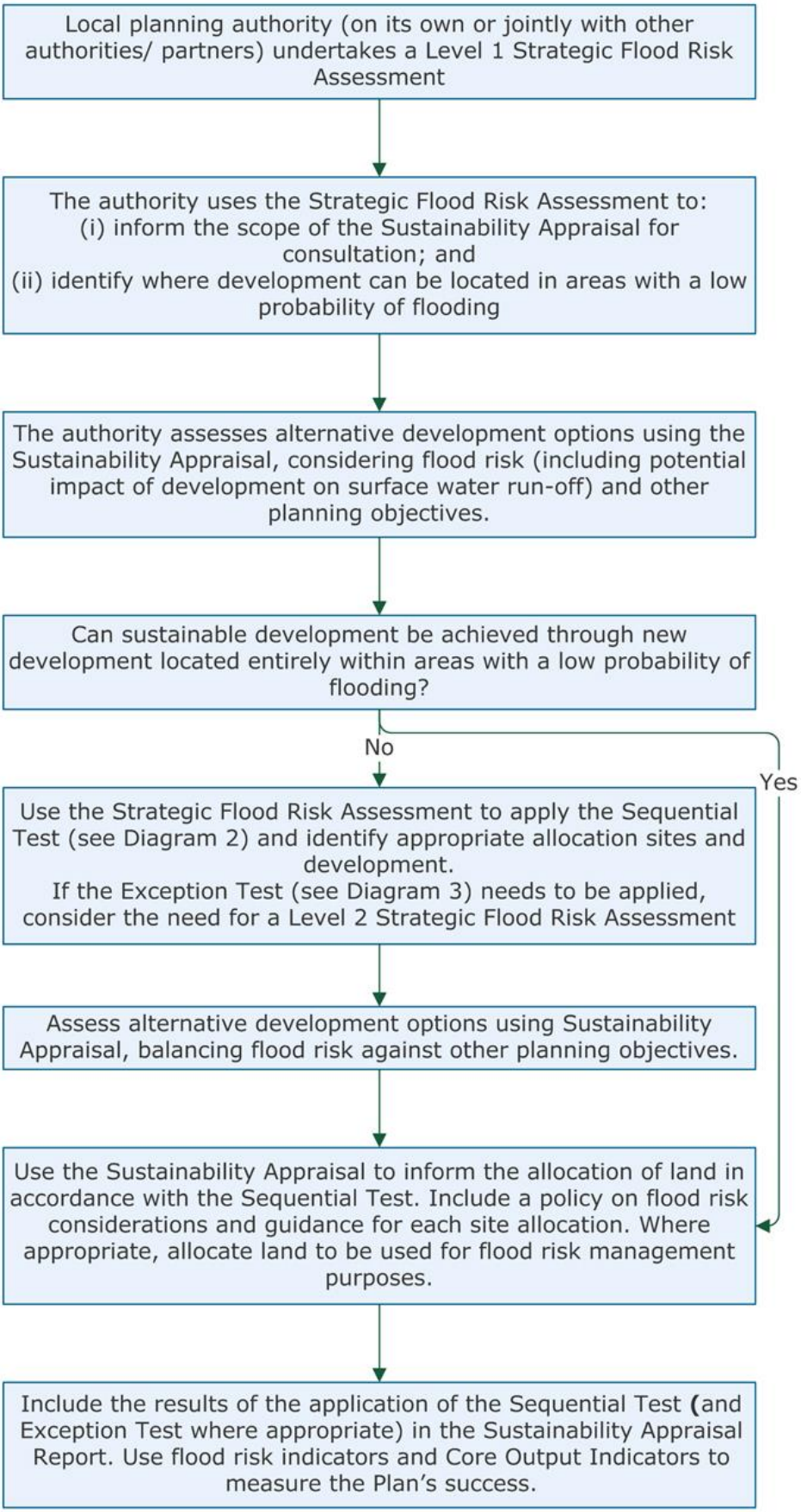
Maps plans showing the LPA area, Main Rivers, ordinary watercourses and flood zones, including the functional floodplain if appropriate (as defined in Planning Policy Guidance – Flood Risk and Coastal Change section para 7-015-20140306), across the local authority area as well as all previously allocated development sites (or sites to be considered in the future as allocations in the future.) In relation to this SFRA it contains the proposed allocation sites identified in the 2017 Regulation 19 Preferred Options consultation);

- an assessment of the risk of flooding in the area from all sources, not just rivers and sea but surface water or reservoirs;
- an assessment of the implications of climate change for flood risk at allocated development sites over an appropriate period;
- flood risk management measures, including location and standard of infrastructure and the coverage of flood warning systems;
- Recommendations about the identification of critical drainage areas and the potential need for surface water management plans.
- 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 site specific Flood Risk Assessments (FRAs) and;
- any specific measures they need to take to manage flood risk such as 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 PPG is shown in the diagram below.

Taking Flood Risk into Account in the Preparation of a Local Plan
(source: NPPF Flood Risk and Coastal Change Section -Diagram 1)



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 catchment includes, but is significantly wider than, 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, Waddington, Clitheroe
Hodder	265	Brennand, Whitendale, Loud Bridge	Slaidburn, Dunsop Bridge
Calder	330	PendleWater, 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, there 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 section 3 below) 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 Exceedance 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 current development plan, the Ribble Valley Adopted Core Strategy (2014) is the significant local land use plan that will guide the area's current and future development. Its particular flood related policies are outlined below with national policy being described in Section 3, however the broad development policy situation in the Borough is summarised below.

2.22 Ribble Valley Borough Council (RVBC) has an area of 226 square miles, the largest District Council within Lancashire County. Over 70% of its area lies in the Forest of Bowland Area of Outstanding Natural Beauty (AONB). Much of the RVBC 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 that preceded the 2014 Core Strategy have been built out and there is continuing demand for more employment development, partly from existing firms seeking new or expanded premises. New employment land allocations will be set out in the developing Housing and Economic Development DPD (HEDPD), whose initial Issues and Options consultations were progressed in the summer of 2016.

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 is to guide housing development into the three larger or Principal settlements and also the more sustainable of the larger villages (the Tier 1 settlements) as set out in Core Strategy Key Statement DS1. The overall housing requirement for the plan period is 5,600 new dwellings with over 90% of these being permitted as of April 2017. Therefore it anticipated that only relatively few housing allocations will be made in the remainder of the plan period including some relating to residual needs within some of the Tier 1 settlements. These allocations will be set out in the forthcoming Housing and Economic Development DPD, the Council's overall allocations DPD. The initial options sites will in part be guided by the recently updated SHLAA which itself is informed by consultations with various flood related bodies such as Environment Agency and United Utilities. The pressures on housing and employment above are expected to continue into the future and will be addressed by relevant Core Strategy policies.

2.24 Core Strategy Key Statement EN1 states that the overall extent of the area's Green belt will be maintained. It also states that some minor changes will be considered where appropriate though no overall review of the area's Green Belt is considered necessary.

2.25 In terms of employment-related development the BAe site at Samlesbury, part of which lies within the RVBC area, is considered within Key Statement EC1 as a regionally significant employment site and the site has been recently designated an Enterprise Zone. In line with the recently updated Employment Land Study the Council aims to allocate an additional 8 hectares of employment land during the life of the plan (excluding development proposed within the Samlesbury site. LPAs are encouraged to review and update current employment land supply and RVBC reviewed its employment land needs in 2013cently completed such a study. The forthcoming HEDPD proposes employment allocations in three sites, one to the east of Longridge, one near to Mellor Brook and a third adjacent to the Time Computes site in the south east of the Borough near Simonstone.

2.26 In terms of retail development Core Strategy policies DMR1, DMR2 and DMR3 set out plan's guidelines, together with Key Statement EC2. Clitheroe, Whalley and Longridge are seen as the major retail centres with specific allocations of overall convenience and comparison future need in terms of overall square meterage set out in EC2.

2.27 RVBC is recently updated its Strategic Housing Land Availability Assessment (SHLAA) to identify future housing sites and the HEDPD makes allocations for housing in Mellor and Wilpshire. It will also be required to maintain a minimum of five years supply of deliverable housing land. The HEDPD proposed allocations have been guided by this SFRA, the SHLAA and other research. United Utilities maintain a sewer flood register and will comment on updates of the SHLAA.

2.28 In terms of transport infrastructure there are no significant developments proposed within the RVBC area within the current East Lancashire Highways and Transport Masterplan (March 2014).

2.29 The Core Strategy's specific flood related policy is DME6 - Water Management. This is used where relevant within the development management process in addition to close consultation with relevant flood related bodies such as the Environment Agency, Lancashire County Council and United Utilities.

3. FLOOD PLANNING POLICY REVIEW

National Policy

Planning Practice Guidance (PPG) Flood Risk and Coastal Change 2016

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 PPG 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 PPG has 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 PPG guidance and advised by Lancashire County Council as the Lead Local Flood Authority in conjunction and the Environment Agency (EA). Finally, at relevant site specific levels, are Flood Risk Assessments (FRA). These should be submitted with a planning application by the developer in consultation with the LPA. This SFRA contains further advice about FRAs.

3.7 The SFRA should influence HEDPD land allocations and individual development proposals by providing the information needed to apply the Sequential Test (see immediately below) set out in PPG 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. PPG 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 1 of Flood Risk and Coastal Change section of PPG 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.

3.9 Tables 2 and 3 of PPG Flood Risk and Coastal Change guidance identify the flood vulnerability of different land uses and the compatibility of these land uses in relation to the Flood Zones identified in Table 1. 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 3 of PPG Flood Risk and Coastal Change section).

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 and Appendix 3) 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)

3.13 **The Flood and Water Management Act 2010**

This sets out the requirement for Lead Local Flood Authorities (LLFAs), in this area Lancashire County Council, to manage "local" flood risk within their areas. "Local" flood risk refers to flooding or flood risk from surface water, ground water or from ordinary watercourses. The Act also outlines the roles and responsibilities of other Risk Management Authorities

3.14 **Flood Risk Management Plans**

(source North West River Basin District Flood Risk Management Plan 2015 – 2021 Part A Pages 18 to 22)

Flood risk management plans highlight the hazards and risks from rivers, the sea, surface water, groundwater and reservoirs and set out how RMAs will work together with communities to manage flood risk.

3.15 **What is the Flood Risk Management Plan for?**

Flood Risk Management Plans (FRMPs) are produced every 6 years and describe the sources and risks of flooding within a river basin district and catchment. They also include information on how RMAs plan to work together with communities and businesses to manage and reduce flood risk. Over the 6 year planning cycle the FRMP will help promote a greater awareness and understanding of the risks of flooding, particularly in those communities at high risk, and encourage and enable householders, businesses and

communities to take action to manage the risks. FRMPs along with River Basin Management Plans (RBMPs) help all those involved in managing water to make decisions that are best for people and the environment.

3.16 **Why are Flood Risk Management Plans Being Prepared?**

This is the first cycle of implementing the Flood Risk Regulations 2009. As a result of this legislation, lead local flood authorities (LLFAs) must prepare FRMPs in Flood Risk Areas, where the risk of flooding from local flood risks is significant (as identified in Preliminary Flood Risk Assessments (PFRAs)) for instance from surface water, groundwater and ordinary watercourses. The Environment Agency is required to prepare FRMPs for all of England covering flooding from main rivers, the sea and reservoirs. Further information on what is a flood risk management plan can be found on the GOV.UK website.

Flood risk and coastal erosion management activities require careful planning to ensure that appropriate, sustainable, options are selected and that they are implemented properly. Actions should be planned effectively, for the long-term, and provide a clear picture of what will be done to manage risk and provide multiple benefits. This may include, for example, linking with other plans such as RBMPs and supporting biodiversity, habitat creation or improving water quality. The Environment Agency and LLFAs are developing FRMPs by drawing existing information together and building on existing Flood and Coastal Erosion Risk Management plans such as: Catchment Flood Management Plans (CFMPs), Shoreline Management Plans (SMPs) and Local Flood Risk Management Strategies (LFRMS) (see Figure 2).

3.17 **What the Plan Does**

The FRMP will help deliver the requirements of the National Flood and Coastal Erosion Risk Management Strategy in England by setting out the measures to manage flood risk now and in the future. The FRMP will:

- Help develop and promote a better understanding of flood and coastal erosion risk
- Provide information about the economic and environmental benefits to inform decision makers
- Identify communities with the highest risk of flooding so that investment can be targeted at those in most need

Measures (actions) in FRMPs do not all have secured funding and are not guaranteed to be implemented. Money is allocated to all RMA measures in the same way and is based on current Government policy that gives the highest priority to lives and homes.

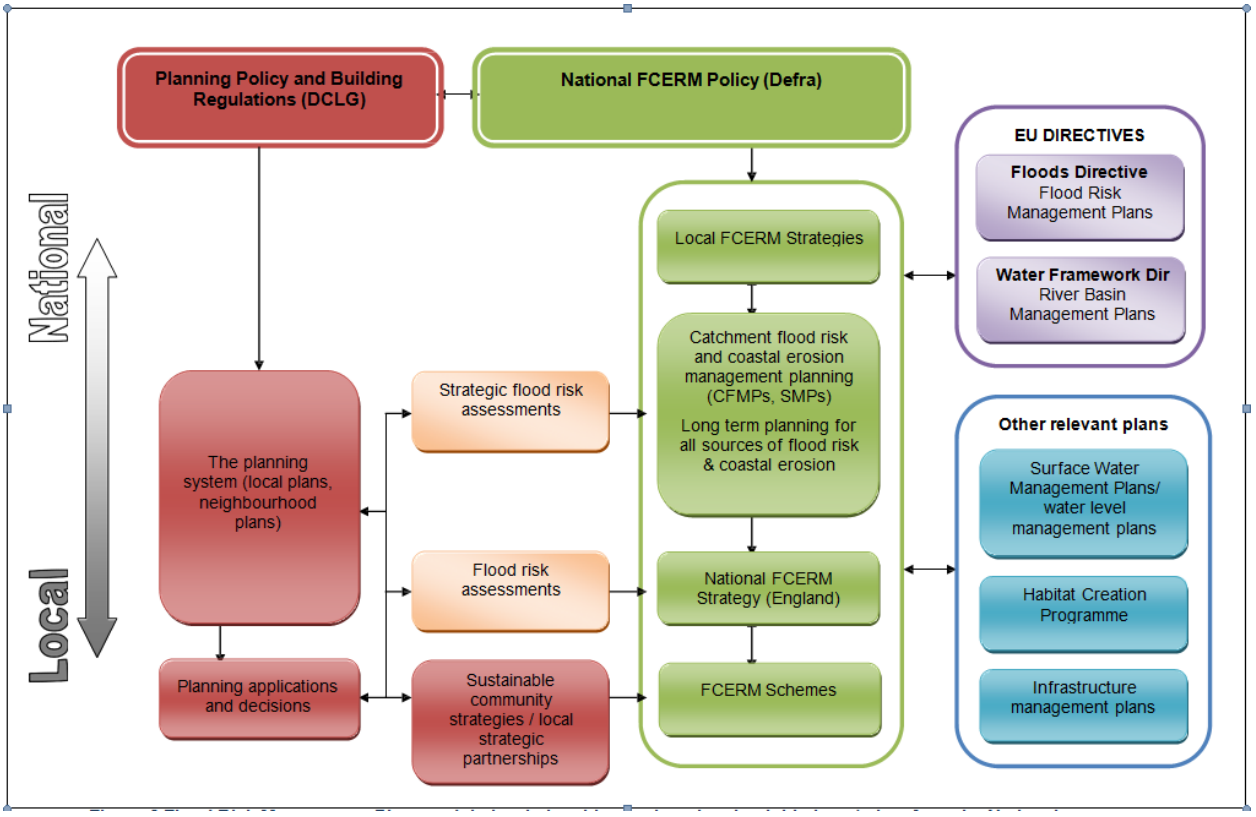
3.18 **What Types of Flood Risk are Included in the Flood Risk Management Plans?**

The FRMP covers the flood risks that the RMAs are responsible for.

The Environment Agency has worked in partnership with other RMAs to pool the information needed to develop the FRMP. Some RMAs have a statutory duty to produce a FRMP as they have areas designated as Flood Risk Areas. Local surface water risk information is only included where lead local flood authorities have a statutory duty to produce a FRMP or where they have volunteered information.

Areas of significant 'local flood risk' were identified from historic flood records and analysis of potential future flooding from surface water, groundwater and ordinary watercourses. These 'Flood Risk Areas' were designated on the basis of there being at least 30,000 people in properties at risk of flooding, or 150 critical services (for example - schools, hospitals, nursing homes, power and water services). This was as shown by locally agreed surface water flood maps produced in 2010 by the Environment Agency and supplemented with data from Lead Local Flood Authorities where available.

Figure 2 Flood Risk Management Plans and Their relationships to Other Planning Initiatives



Catchment Flood Management Plan (CFMP)

3.19 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. All the Ribble Valley parts of the Action Plan are set out in Appendix 4 of this document. These policies take into account the likely future impact of changes in climate and the effects of land management. The CFMP remains a significant source of information for this updated SFRA.

3.20 However, while the CFMP is still live at the time of updating this SFRA (April 2017) the general future of CRMPs is under review and parts of them have been incorporated into a new suite of flood plans called Flood Risk Management Plans (FRMPs). The relevant FRMP for the Ribble is the North West River Basin District Flood Risk Management Plan (FRMP) which was published in March 2016. The FRMP is available at the following web link: https://www.gov.uk/government/publications/north-west-river-basin-district-flood-risk-management-plan.

While the CFMP covers a period of 50 to 100 years the FRMP covers a six year period (2015 – 2021). For overall clarity all of the CFMP Action Plan policies are included in Appendix 4 of this SFRA however it should also be borne in mind that some of these policies that relate to the FRMPs six year time frame have also been transferred into the FRMP.

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.

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 Local Plan 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. More detail on FRAs can be found in Appendix 3.

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 PPG 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 each presenting a range of different risks:

A. 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 localised 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.

B. 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.

C. 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.

D. 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.

E. 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.

F. 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 assembled 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 exact 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
2012 Calder,	Whalley
2015 Ribble,Calder	Whalley, Ribchester and outlying villages

The December 2015 flooding affected communities in Billington, Whalley, Ribchester, Clitheroe and Longridge. Parts of the Ribble catchment received five times the normal December monthly rainfall. In Whalley the event approached a 1 in 1,000 chance of occurring. At Samlesbury in the far west of the RVBC area the Ribble peaked at an all- time record of 6.9 m. Most rivers in the catchment set new highest river level records over Christmas 2015.

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%).

4.9 A site specific flood risk assessment (FRA) is required for proposals of 1 hectare or greater in Flood Zone 1; all proposals for new development (including minor development and change of use) in Flood Zones 2 and 3, or in an area within Flood Zone 1 which has critical drainage problems (as notified to the local planning authority by the Environment Agency); and where proposed development or a change of use to a more vulnerable class may be subject to other sources of flooding. More detail regarding FRAs can be found in Appendix 3.

4.10 Within PPG Table 1, 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 Appendix 1.

Flood Zone 3B (Functional Floodplain)

4.11 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.

4.12 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.

4.13 PPG 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.

4.14 Settlement in Ribble Valley is made up of a number of larger towns – the three Principal Settlements of Clitheroe, Longridge and Whalley and also in a number of villages and hamlets spread across the largest District in Lancashire. The evidence that underpins the 2014 Core Strategy indicates that the Borough will need to plan for an additional 5,600 dwellings and an additional 8 hectares of employment land in its plan period (2008 – 2028).

4.15 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.

4.16 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.

4.17 Within Zone 3B only water compatible uses and the essential infrastructure listed in PPG Table 3 (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

4.18 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

4.19 **Surface Water Lifetime Management and Maintenance Plan**

As the SuDS Approval Board (SAB) approach is not currently being pursued by Government, the use of SuDS have been incorporated within the planning legislative framework and guidance. Under these arrangements, in considering planning application, local planning authorities should consult the relevant LLFA on the management of surface water. They should also satisfy themselves that the proposed minimum standards of operation are appropriate and ensure through the use of planning conditions or obligations that there are clear arrangements in place for the ongoing maintenance over the lifetime of the development. The SuDS system should be designed to ensure that the maintenance and operation requirements are economically proportionate. The LLFA will recommend that an appropriate condition be appended to the decision notice and as a minimum would expect a developer to provide information on:

- The arrangements for adoption by an appropriate public body or statutory undertaker, management and maintenance by a Residents' Management Company
- The arrangements concerning appropriate funding mechanisms for its on-going maintenance of all elements of the sustainable drainage system (including mechanical components) and will include elements such as:
- on-going inspections relating to performance and asset condition assessments
- operation costs for regular maintenance, remedial works and irregular maintenance caused by less sustainable limited life assets or any other arrangements to secure the operation of the surface water drainage scheme throughout its lifetime;
- Means of access for maintenance and easements where applicable.

4.20 **Ordinary Watercourses and Land Drainage Consents**

Lancashire County Council, as LLFA, is responsible for ordinary watercourse regulation within the county. Ordinary watercourses include drains, streams, ditches, and passages through which water flows that do not form part of main rivers. Main rivers are managed by the Environment Agency. If a developer is looking to carry out construction work or make alterations to a watercourse they need to get permission from the county council first, under the Land Drainage Act 1991 (sometimes known as land drainage consent). It is important that developers understand that planning approval does not automatically give Land Drainage Consent. This is a separate process, outside of the planning legislation and Land Drainage Consent pre-application advice should be encouraged before a planning application is submitted.

4.21 **Riparian Responsibilities**

Riparian owners (those who own land adjoining, above, or with a watercourse running through it) are responsible for the maintenance of watercourses on their land. A riparian owner can be an individual land owner, a range of individuals, private companies, local authorities or other organisations. These riparian responsibilities apply to both ordinary watercourses and main rivers. Riparian owners must let water flow through their land without any obstruction, pollution or diversion which affects the rights of others. They are responsible for maintaining the bed and banks of the watercourse as well as the trees and shrubs growing on the banks. Riparian owners must also keep any structure, such as culverts, trash screens, weirs and mill gates, clear of debris. They must accept flood flows through their land, even if these are caused by inadequate capacity downstream. However a landowner has no duty in common law to improve the drainage capacity of a watercourse for which they are responsible.

4.22 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. From October 2011 UU also became responsible for all privately owned sewers which connect to an existing public sewer.

4.23 United Utilities have 786km of water mains and are responsible for 225km of public sewers within the Ribble Valley Borough Council area. On becoming responsible for private sewers which connect to public ones this has led to an increase of 73% of sewer length across the region, although exact figures for this increase in Ribble Valley are not available. 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.

4.24 UU have made some comments on sewer capacity issues relating to sites that have emerged from recent (2013) 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

4.25 This SFRA has been produced to underpin the Council's site allocation DPD the forthcoming Housing and Economic Development DPD (HEDPD). As a part of this 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.

4.26 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 its development. In accordance with PPG, 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

4.27 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.

Highways Drainage

4.28 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. The Highways Authority also has responsibilities under the 2010 Flood Water Management Act as a Risk Management Authority in their own right. 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

4.29 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

4.30 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.

4.31 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.

4.32 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. 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.

4.33 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

4.34 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.

4.35 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).

4.36 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.

4.37 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.

4.38 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.

4.39 The level of analysis in the CFMP shown above is not presented in the Flood Risk Management Plan (FRMP), but it does indicate that the risk presented in the CFMPs used a 20% allowance for climate change that is now considered too low based on UKCP 2009 data. The FRMP headline message is.

"Flood risk is increasing, perhaps substantially, so Planners, Emergency Planners, Asset Managers and others will need to mitigate this through a mix of collaborative working, planning policies, use of "worst case" scenarios, development of contingency plans and some detailed analysis."

Current Flood Risk Management

Condition and Maintenance of Flood Defences

4.40 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.

4.41 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)

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	Flood defence	1 in 100 year flood	Built 2010	
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	Flood defence	1 in 100 year flood	Built 2009	
Dunsop Bridge	No flood defence identified within NFCDD	-	-	-
Whalley	Flood defences present Downstream of bridge over Calder			
Ribchester	No flood defences identified within NFCDD	-	-	-

4.42 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.

4.43 **Flood Defence Measures Outside the Borough.**

As outlined below there are plans to develop flood defences in the Padiham area close to the south eastern part of the Borough which it is hoped have additional benefits to adjacent areas downstream, including parts of Ribble Valley

In March 2015 the EA completed an Initial Assessment Report on the River Calder at Padiham to assess the costs, benefits and partnership funding requirements of a fluvial flood alleviation scheme for Padiham. The study, undertaken before the December 2015 floods in Padiham, assessed a number of options. The current preferred option is for raised defences including raising existing flood walls and an embankment on land to the east this site. This option would protect to a 0.5% standard of protection (or a 200 yr flood event) at a cost of approximately £4 million. Following the Boxing Day 2015 flood, and based on likely revisions to flood outlines in the town following that event and revised partnership funding calculations based on avoided damages, the EA is confident that it can achieve sufficient benefits from a defence scheme such that it can achieve £1m of Government Grant-in-Aid funding. This amount, together with the £3m of Local Growth Funds secured by the Council through the LEP, should be sufficient to deliver the scheme to better protect the Baxi site and other parts of the town from flooding. Following completion of a review of flood outlines and confirmation of scheme costs in summer 2017, the Council will then be in a position to enter into a formal partnership with the EA to move forward with a scheme, before progressing detailed design and engaging with suitable contractors. The Plan timescale is up to 2032 and the site could come forward if necessary in a later phase when these issues have been addressed and a flood alleviation scheme agreed. This site may have an important role in delivering the flood alleviation scheme as well as benefitting from it.

Environment Agency Maintenance and Inspection Activities

4.44 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.

4.45 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

4.46 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.

4.47 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.

4.48 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

4.49 The Environment Agency has established five formal Flood Warning Areas in RVBC's area, these are Low Moor (Clitheroe), Mearley Brook (Clitheroe), Pimlico Brook (Clitheroe), Whalley and Ribchester. The five Ribble Valley Flood Warning Plans mentioned above, which include maps, are available at the links below (please note that most of the FWAs are presented on a series of maps and hence there may be more than one link to each FWA.) :

1. Low Moor (Clitheroe) http://apps.environment-agency.gov.uk/flood/34681.aspx?area=012FWFL9A&page=1&type=Town&term=Clitheroe

2A. Mearley Brook (Clitheroe) A http://apps.environment-agency.gov.uk/flood/34681.aspx?area=012FWFL31A&page=1&type=Town&term=Clitheroe

2B. Mearley Brook (Clitheroe) B http://apps.environment-agency.gov.uk/flood/34681.aspx?area=012FWFL31B&page=1&type=Town&term=Clitheroe

2C. Mearley Brook (Clitheroe) C http://apps.environment-agency.gov.uk/flood/34681.aspx?area=012FWFL31C&page=1&type=Town&term=Clitheroe

3A. Pimlico Brook (Clitheroe) A http://apps.environment-agency.gov.uk/flood/34681.aspx?area=012FWFL41A&page=1&type=Town&term=Clitheroe

3B. Pimlico Brook (Clitheroe) B http://apps.environment-agency.gov.uk/flood/34681.aspx?area=012FWFL41B&page=1&type=Town&term=Clitheroe

4A. Ribchester A http://apps.environment-agency.gov.uk/flood/34681.aspx?area=012FWFL5A

4B. Ribchester B http://apps.environment-agency.gov.uk/flood/34681.aspx?area=012FWFL5B

5A. Whalley A http://apps.environment-agency.gov.uk/flood/34681.aspx?area=012FWFL21A

5B. Whalley B http://apps.environment-agency.gov.uk/flood/34681.aspx?area=012FWFL21B

5C. Whalley C http://apps.environment-agency.gov.uk/flood/34681.aspx?area=012FWFL21C

These plans are incorporated into the Ribble Valley section of the Lancashire Resilience Forum Multi Agency Flood Plan.

4.50 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.

4.51 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.

4.52 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 aims 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.

4.53 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 introduction of the National Flood Forecasting System in 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 the Ribble Catchment Flood Management Plan and in recent Government guidance "Flood Risk Assessments; Climate Change Allowances" published in February 2016.

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 Flood Risk Assessments published by the Environment Agency in February 2016. 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.

What Climate Change Allowances Are

5.4 Making an allowance for climate change in flood risk assessments helps to minimise vulnerability and provide resilience to flooding and coastal change in the future.

The climate change allowances are predictions of anticipated change for:

- peak river flow by river basin district
- peak rainfall intensity
- sea level rise
- offshore wind speed and extreme wave height

They are based on climate change projections and different scenarios of carbon dioxide (CO2) emissions to the atmosphere. There are different allowances for different epochs or periods of time over the next century.

5.5 **When to Use the Climate Change Allowances**

EA will use these allowances as benchmarks when providing advice on flood risk assessments and strategic flood risk assessments.

5.6 **Temporary Exceptions for Transitional Arrangements That Apply as of 19 February 2016**

In terms of flood risk assessments prepared using the previous allowances (published in 2013) EA will base its advice on the previous allowances where development plans or proposals are well advanced. This will include:

- a development plan already submitted for examination
- a valid planning application already submitted to the local planning authority

If proposed development is particularly sensitive to flood risk or is in a vulnerable location, EA will base its advice on the allowances in this advice.

5.7 **Other exceptions – when it might be appropriate to use other data or climate change allowances**

There may be circumstances where local evidence supports the use of other data or allowances. For example, the impact of climate change on peak river flow may not be even across all river catchments in a river basin district. In EA's role as a technical advisor they may want to check how and why the data in a particular plan or proposal was used.

Table 3 **Peak River Flow Allowances for North West River Basin District**
(Use 1961 to 1990 baseline) Environment Agency 19th Feb 2016

Allowance Category	**Total potential change anticipated for the "2020s" (2015 - 2039**	**Total potential change anticipated for the "2050s" (2040 – 2069**)	**Total potential change anticipated for the "2080s" (2070 – 2115)**
Upper End	20%	35%	70%
Higher Central	20%	30%	35%
Central	15%	25%	30%

5.8 **Explanation of Above Table**

Types of Allowances.

Peak River Flow Allowances by River Basin District

The peak river flow allowances show the anticipated changes to peak flow by river basin district. River Basins are defined on maps available from EA. These can be used within SFRAs such as this document and also in FRAs.

The range of allowances in the above table is based on percentiles. A percentile is a measure used in statistics to describe the proportion of possible scenarios that fall below an allowance level. The 50th percentile is the point at which half of the possible scenarios for peak flows fall below it and half fall above it. The:

- central allowance is based on the 50th percentile
- higher central is based on the 70th percentile
- upper end is based on the 90th percentile

So, if the central allowance is 30%, scientific evidence suggests that it is just as likely that the increase in peak river flow will be more than 30% as less than 30%.

At the higher central allowance 70% of the possible scenarios fall below this value. So, if the higher allowance is 40%, then current scientific evidence suggests that there is a 70% chance that peak flows will increase by less than this value, but there remains a 30% chance that peak flows will increase by more.

5.9 **Decide Which Peak River Flow Allowances to Use for Different Types of Assessment**

EA uses the following data and standards as the benchmarks for the advice it gives as a statutory consultee.

- peak river flow allowances shown in Table 3 above for both flood risk assessments and strategic flood risk assessments such as this document.

- flood risk vulnerability classification for the type of development and flood zone over the lifetime of the proposed development, in development plan allocations for strategic flood risk assessments
- flood risk vulnerability classification for the type of development and flood zone as a guide to decide which allowances to use based on the vulnerability of potential development for flood risk assessments . Also the lifetime of the proposed development should also be used to decide which of the future time period in the various tables is most relevant.

It will also be important to inform EA about whether any high++ allowances (see para ??? below) for flood risk assessment or strategic flood risk assessment have been necessary.

5.10 **Using Peak River Flow Allowances for Flood Risk Assessments**

To decide which allowances apply to a development plan allocation or to a particular proposal in an application both the Flood Zone and the Flood Risk Vulnerability Classification will need to be used. Using both together will enable the range of potential flood impact to be understood. The higher central, central, and upper end peak river flow allowances are mentioned above in Table 3.

5.11 **In Flood Zone 2**

- essential infrastructure – use the higher central and upper end to assess a range of allowances
- highly vulnerable – use the higher central and upper end to assess a range of allowances
- more vulnerable – use the central and higher central to assess a range of allowances
- less vulnerable – use the central allowance
- water compatible – use none of the allowances

5.12 **In Flood Zone 3a**

- essential infrastructure – use the upper end allowance
- highly vulnerable – development should not be permitted
- more vulnerable – use the higher central and upper end to assess a range of allowances
- less vulnerable – use the central and higher central to assess a range of allowances
- water compatible – use the central allowance

5.13 **In Flood Zone 3b**

- essential infrastructure – use the upper end allowance
- highly vulnerable – development should not be permitted
- more vulnerable – development should not be permitted
- less vulnerable – development should not be permitted
- water compatible – use the central allowance

If (exceptionally) development is considered appropriate when not in accordance with flood zone vulnerability categories, then it would be appropriate to use the upper end allowance.

5.14 **Peak Rainfall Intensity Allowance**

Increased rainfall affects river levels and land and urban drainage systems.

When to Use the Peak Rainfall Intensity Allowance

Table 4 shows anticipated changes in future extreme rainfall intensity in small and urban catchments. For flood risk assessments (FRAs) and strategic flood risk assessments (SFRAs), both the central and upper end allowances will need to be used to understand the range of impact.

Table 4 Peak Rainfall Intensity Allowance in Small and Urban Catchments (use 1961 to 1990 baseline)

Applies across all of England	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper end	10%	20%	40%
Central	5%	10%	20%

5.16 **High++ Allowances for Peak River Flood Flow and Mean Sea Level**

The high++ allowances will only apply in assessments for developments that are very sensitive to flood risk and with lifetimes beyond the end of the century. For example, infrastructure projects or developments that significantly change existing settlement patterns. This includes urban extensions and new settlements.

The high++ allowances are in EA guidance "Adapting to Climate Change – advice for flood and coastal erosion risk management authorities" (pages 11 – 12 for peak river flows, pages 15 – 16 for mean sea level

5.17 **How to Use a Range of Allowances for Peak River Flow and Peak Rainfall Intensity**

To decide which allowances to use to inform the flood levels that the flood risk management strategy will be based on for a development or development plan allocation, it is therefore necessary to consider the following:

- the likely depth, speed and extent of flooding for each allowance of climate change over time considering the allowances for the relevant epoch (2020s, 2050s and 2080s),
- the vulnerability of the proposed development types or land use allocations to flooding,
- the 'built in' resilience measures used, for example, raised floor levels and;
- the capacity or space in the development to include additional resilience measures in the future, using a 'managed adaptive' approach

5.19 **Future Flood Risk Management**

There may be instances where some flood risk management measures are not necessary now but may be in the future. This is a 'managed adaptive approach', for example, setting a development away from a river so it is easier to improve flood defences in the future. EA will consider whether a managed adaptive approach might be appropriate when reviewing applications, plans or proposals.

EA can give a free preliminary opinion to applicants on their proposals at pre-application stage. There is a charge for more detailed pre-application planning advice. The local EA office can be contacted for a consultation. The Lead Local Flood Authority (in this area Lancashire County Council) can give advice on flood risk from local watercourses, surface, or groundwater.

5.20 **The 2016 Allowances and the Catchment Flood Management Plan (CFMP)**

It is important to remember in relation to the above climate change allowances and the Catchment Flood Management Plan (CFMP) mentioned in Section 3 above that the future flood risk presented in the CFMP is not based on the above 2016 guidance and s therefore the CFMP should be used as a starting point to inform the consideration of climate change impacts through more detailed site specific assessments for development proposals in Flood Zones 2 and 3.

6. FLOOD RISK ASSESSMENT (FRA) GUIDANCE (Source PPG Flood Risk and Coastal Change section 10)

6.1 What is a Site-specific Flood Risk Assessment?

A site-specific flood risk assessment is carried out by (or on behalf of) a developer to assess the flood risk to and from a development site. Where necessary (see footnote 5 in the National Planning Policy Framework), the assessment should accompany a planning application submitted to the local planning authority. The assessment should demonstrate to the decision-maker how flood risk will be managed now and over the development's lifetime, taking climate change into account, and with regard to the vulnerability of its users (see Table 3 Flood Risk Vulnerability in Appendix 1).

The objectives of a site-specific flood risk assessment are to establish:

- 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;
- the evidence for the local planning authority to apply (if necessary) the Sequential Test, and;
- whether the development will be safe and pass the Exception Test, if applicable.

For more detail see Appendix 3.

6.2 What Level of Detail is Needed in a Flood Risk Assessment?

The information provided in the flood risk assessment should be credible and fit for purpose. Site-specific flood risk assessments should always be proportionate to the degree of flood risk and make optimum use of information already available, including information in a Strategic Flood Risk Assessment for the area, and the interactive flood risk maps available on the Environment Agency's web site.

A flood risk assessment should also be appropriate to the scale, nature and location of the development. For example, where the development is an extension to an existing house (for which planning permission is required) which would not significantly increase the number of people present in an area at risk of flooding, the local planning authority would generally need a less detailed assessment to be able to reach an informed decision on the planning application. For a new development comprising a greater number of houses in a similar location, or one where the flood risk is greater, the local planning authority would need a more detailed assessment.

6.3 What Further Advice is Available on the Preparation of a Site-specific Flood Risk Assessment?

To assist the developer, the local planning authority should set out and agree the scope of the flood risk assessment, using the Environment Agency Standing Advice on Flood risk (see link in PPG) or in direct consultation with the Agency and/or any other relevant flood risk management bodies. Applicants for planning permission (or prior approval in the case of certain permitted development rights) will find the Agency's advice on assessing flood risk for planning applications. helpful when preparing a site-specific flood risk assessment for, and before designing, a development that raises lower risk concerns.

The checklist in Appendix 3 may be helpful to applicants/developers in preparing a site-specific flood risk assessment.

6.4 When you Need an Assessment

You need to do a flood risk assessment for most developments within one of the food zones.

This includes developments:

- in flood zone 2 or 3 including minor development and change of use
- more than 1 hectare (ha) in flood zone 1
- less than 1 ha in flood zone 1, including a change of use in development type to a more vulnerable class (for example from commercial to residential), where they could be affected by sources of flooding other than rivers and the sea (for example surface water drains, reservoirs)
- in an area within flood zone 1 which has critical drainage problems as notified by the Environment Agency.

6.5 This should identify and assess the risks of all forms of flooding to and from the development at the time of the application and throughout the lifetime of the development and demonstrate how these flood risks will be managed, taking climate change into account and having regard to the vulnerability of its users.

6.6 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, Lead Local Flood Authority, 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.

6.7 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.

6.8 PPG 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.. 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

6.9 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 of an FRA

6.10 PPG 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.

6.11 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 Planning Practice Guidance (see PPG section Flood Risk and Coastal Change) 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 The Secretary of State for Communities and Local Government delivered a written ministerial statement on the implementation of sustainable drainage systems (SuDS) in Parliament on 18 December 2014. The statement made changes to the National Planning Policy Framework (NPPF) which in turn made SuDS a material consideration in the determination of planning applications for major developments. These changes came into effect on 6 April 2015.

7.2 Alongside the changes to NPPF the Town and Country Planning (Development Management procedure) (England) Order was amended making Lancashire County Council, in its role as Lead Local Flood Authority (LLFA), a statutory consultee in the planning process for major development proposals, as defined by Part 1 (2) of The Town and Country Planning (Development Management Procedure) (England) Order 2015, which have surface water implications, starting from 15th April 2015.

7.3 Consequently, developers need to provide SuDS on major developments where appropriate, while paying due regard to the following:

- National Planning Policy Framework (NPPF)
- Written statement on sustainable drainage systems (HCWS161)
- Planning Practice Guidance (PPG)
- Non-statutory technical standards for sustainable drainage systems
- District local plan policies

7.4 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*.

7.5 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.

7.6 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.

7.7 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.

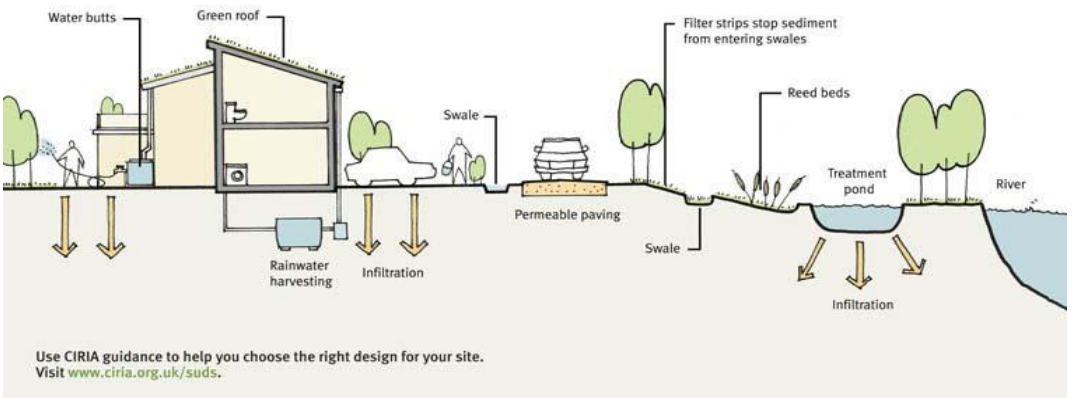
Suitability of SUDS Techniques to achieve these aims

	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

7.8 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) or

http://www.susdrain.org/delivering-suds/using-suds/suds-principles/management-train.html

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 C753 *The SuDS Manual* (2015) provides further detailed information and is available at the web address below:
http://www.susdrain.org/resources/ciria-guidance.html#cgsuds



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

7.9 Local authorities should promote the use of SuDS for the management of run-off and 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.

7.10 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.

7.11 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.

7.12 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.

7.13 LPAs should work closely with the Environment Agency, Lead Local Flood Authorities, 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 PPG, DCLG)

The Sequential Test

1. What is the Sequential, Risk-based Approach to the Location of Development?

This general approach is designed to ensure that areas at little or no risk of flooding from any source are developed in preference to areas at higher risk. The aim should be to keep development out of medium and high flood risk areas (Flood Zones 2 and 3) and other areas affected by other sources of flooding where possible.

Application of the sequential approach in the plan-making process, in particular application of the Sequential Test, will help ensure that development can be safely and sustainably delivered and developers do not waste their time promoting proposals which are inappropriate on flood risk grounds. According to the information available, other forms of flooding should be treated consistently with river flooding in mapping probability and assessing vulnerability to apply the sequential approach across all flood zones.

Waste and mineral planning authorities should apply the sequential approach to the allocation of sites for waste management and, where possible, mineral extraction and processing. It should also be recognised that mineral deposits have to be worked where they are (and sand and gravel extraction is defined as 'water-compatible development' in Table 2, acknowledging that these deposits are often in flood risk areas).

However, mineral working should not increase flood risk elsewhere and needs to be designed, worked and restored accordingly.

Mineral workings can be large and may afford opportunities for applying the sequential approach at the site level. It may be possible to locate ancillary facilities such as processing plant and offices in areas at lowest flood risk. Sequential working and restoration can be designed to reduce flood risk by providing flood storage and attenuation. This is likely to be most effective at a strategic (county) scale.

2. What is the Aim of the Sequential Test for the Location of Development?

The Sequential Test ensures that a sequential approach is followed to steer new development to areas with the lowest probability of flooding. The Flood Zones as refined in the Strategic Flood Risk Assessment for the area provide the basis for applying the Test. The aim is to steer new development to Flood Zone 1 (areas with a low probability of river or sea flooding). Where there are no reasonably available sites in Flood Zone 1, local planning authorities in their decision making should take into account the flood risk vulnerability of land uses and consider reasonably available sites in Flood Zone 2 (areas with a medium probability of river or sea flooding), applying the Exception Test if required. Only where there are no reasonably available sites in Flood Zones 1 or 2 should the suitability of sites in Flood Zone 3 (areas with a high probability of river or sea flooding) be considered, taking into account the flood risk vulnerability of land uses and applying the Exception Test if required.

Note: Table 2 categorises different types of uses & development according to their vulnerability to flood risk. Table 3 maps these vulnerability classes against the flood zones set out in Table 1 to indicate where development is 'appropriate' and where it should not be permitted.

Within each flood zone, surface water and other sources of flooding also need to be taken into account in applying the sequential approach to the location of development.

3. Applying the Sequential Test in the Preparation of a Local Plan

This is illustrated in Diagram 2 (below). As some areas at lower flood risk may not be suitable for development for various reasons and therefore out of consideration, the Sequential Test should be applied to the whole local planning authority area to increase the possibilities of accommodating development which is not exposed to flood risk. More than one local planning authority may jointly review development options over a wider area where this could potentially broaden the scope for opportunities to reduce flood risk and put the most vulnerable development in lower flood risk areas.

Diagram 2: Application of the Sequential Test for Local Plan preparation (source PPG)

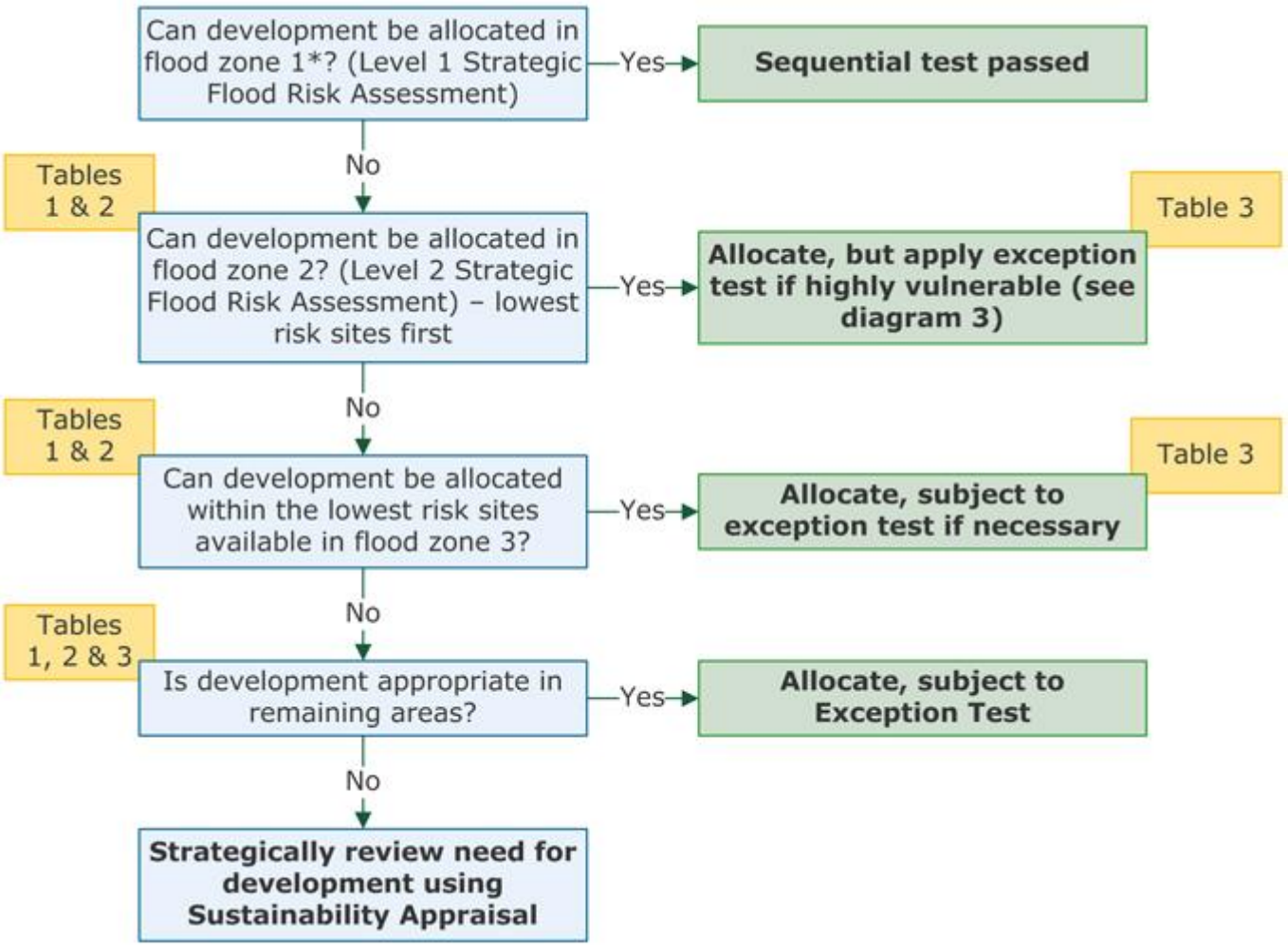


Table 1: Flood Zones

These Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences. They are shown on the Environment Agency's Flood Map for Planning (Rivers and Sea), available on the Environment Agency's web site, as indicated in the table below.

Flood Zone	Definition
Zone 1 (Low Probability)	Land having a less than 1 in 1,000 annual probability of river or sea flooding.(Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
Zone 2 (Medium Probability)	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)

Zone 3a **(High Probability)**	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)
Zone 3b **(The Functional Floodplain)**	This zone comprises land where water has to flow or be stored in times of flood. Local Planning Authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly in agreement with the Environment Agency. (not separately distinguished from Zone 3a on the map)

Note: The Flood Zones shown on the Environment Agency's Flood Map for Planning (Rivers and Sea) do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding. Reference should therefore also be made to the Strategic Flood Risk Assessment inn considering location and potential future flood risks to developments and land uses.

Table 2: Flood Risk Vulnerability Classification

Essential Infrastructure

- Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk.
- Essential utility infrastructure which has to be located in a flood risk area for operational reasons, oncluding electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood.
- Wind turbines.

Highly Vulnerable

- Police and ambulance stations; fire stations and command centres; 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. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as 'Essential Infrastructure').

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

- Police, ambulance and fire stations which are not required to be operational during flooding.
- Buildings used for shops; financial, professional and other services; restaurants, cafes and hot food takeaways; offices; general industry, storage and distribution; non-residential institutions not included in the 'More Vulnerable' class; 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 works which do not need to remain operational during times of flood.
- Sewage treatment works, if adequate measures to control pollution and manage sewage during flooding events are in place.

Water-Compatible Development

- Flood control infrastructure.
- Water transmission infrastructure and pumping stations.
- Sewage transmission infrastructure and pumping stations.
- Sand and gravel working.
- Docks, marinas and wharves.
- Navigation facilities.
- Ministry of Defence 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.

* Landfill is as defined in Schedule 10 to the Environmental Permitting (England and Wales) Regulations 2010.

Table 3 Flood Risk Vulnerability and Flood Zone "Compatibility"

Flood Zones	**Flood Risk Vulnerability Classification**				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	✗	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	✗	✗	✗	✓*

Key:

✓ Development is appropriate ✗ Development should not be permitted.

Notes to Table 3:

This table does not show the application of the Sequential Test which should be applied first to guide development to Flood Zone 1, then Zone 2, and then Zone 3; nor does it reflect the need to avoid flood risk from sources other than rivers and the sea;

The Sequential and Exceptions Tests do not need to be applied to minor developments and changes of use, except for a change of use to a caravan, camping or chalet site, or to a mobile home or park home site;

Some developments may contain different elements of vulnerability and the highest vulnerability category should be used, unless the development is considered in its component parts.

† In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.

* In Flood Zone 3b (functional floodplain) essential infrastructure that has to be there and has passed the Exception Test, and water-compatible uses, 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.

4. How should the Sequential Test be Applied to Planning Applications?

The Sequential Test does not need to be applied for individual developments on sites which have been allocated in development plans through the Sequential Test, or for applications for minor development or change of use (except for a change of use to a caravan, camping or chalet site, or to a mobile home or park home site).

Nor should it normally be necessary to apply the Sequential Test to development proposals in Flood Zone 1 (land with a low probability of flooding from rivers or the sea), unless the Strategic Flood Risk Assessment for the area, or other more recent information, indicates there may be flooding issues now or in the future (for example, through the impact of climate change).

For individual planning applications where there has been no sequential testing of the allocations in the development plan, or where the use of the site being proposed is not in accordance with the development plan, the area to apply the Sequential Test across will be defined by local circumstances relating to the catchment area for the type of development proposed. For some developments this may be clear, for example, the catchment area for a school. In other cases it may be identified from other Local Plan policies, such as the need for affordable housing within a town centre, or a specific area identified for regeneration. For example, where there are large areas in Flood Zones 2 and 3 (medium to high probability of flooding) and development is needed in those areas to sustain the existing community, sites outside them are unlikely to provide reasonable alternatives.

When applying the Sequential Test, a pragmatic approach on the availability of alternatives should be taken. For example, in considering planning applications for extensions to existing business premises it might be impractical to suggest that there are more suitable alternative locations for that development elsewhere. For nationally or regionally important infrastructure the area of search to which the Sequential Test could be applied will be wider than the local planning authority boundary.

Any development proposal should take into account the likelihood of flooding from other sources, as well as from rivers and the sea. The sequential approach to locating development in areas at lower flood risk should be applied to all sources of flooding, including development in an area which has critical drainage problems, as notified to the local planning authority by the Environment Agency, and where the proposed location of the development would increase flood risk elsewhere.

Further advice on the Sequential Test process available from the Environment Agency (flood risk standing advice)

5. Who is Responsible for Deciding Whether an Application Passes the Sequential Test?

It is for local planning authorities, taking advice from the Environment Agency as appropriate, to consider the extent to which Sequential Test considerations have been satisfied, taking into account the particular circumstances in any given case. The developer should justify with evidence to the local planning authority what area of search has been used when making the application. Ultimately the local planning authority needs to be satisfied in all cases that the proposed development would be safe and not lead to increased flood risk elsewhere.

6. What is the Exception Test?

The Exception Test, as set out in paragraph 102 of the Framework, is a method to demonstrate and help ensure that flood risk to people and property will be managed satisfactorily, while allowing necessary development to go ahead in situations where suitable sites at lower risk of flooding are not available.

Essentially, the two parts to the Test require proposed development to show that it will provide wider sustainability benefits to the community that outweigh flood risk and that it will be safe for its lifetime without increasing flood risk elsewhere and where possible reduce flood risk overall.

7. How can Wider Sustainability Benefits to the Community that Outweigh Flood Risk be Demonstrated?

Evidence of wider sustainability benefits to the community should be provided, for instance, through the sustainability appraisal. If a potential site allocation fails to score positively against the aims and objectives of the sustainability appraisal, or is not otherwise capable of demonstrating sustainability benefits, the local planning authority should consider whether the use of planning conditions and/or planning obligations could make it do so. Where this is not possible the Exception Test has not been satisfied and the allocation should not be made.

8. What Needs to be Considered to Demonstrate that Development Will be Safe for its Lifetime?

Wider safety issues need to be considered as part of the plan preparation. If infrastructure fails then people may not be able to stay in their homes. Flood warnings and evacuation issues therefore need to be considered in design and layout of planned developments. In considering an allocation in a Local Plan a level 2 Strategic Flood Risk Assessment should inform consideration of the second part of the Exception Test.

9. What is Considered to be the Lifetime of Development in Terms of Flood Risk and Coastal Change?

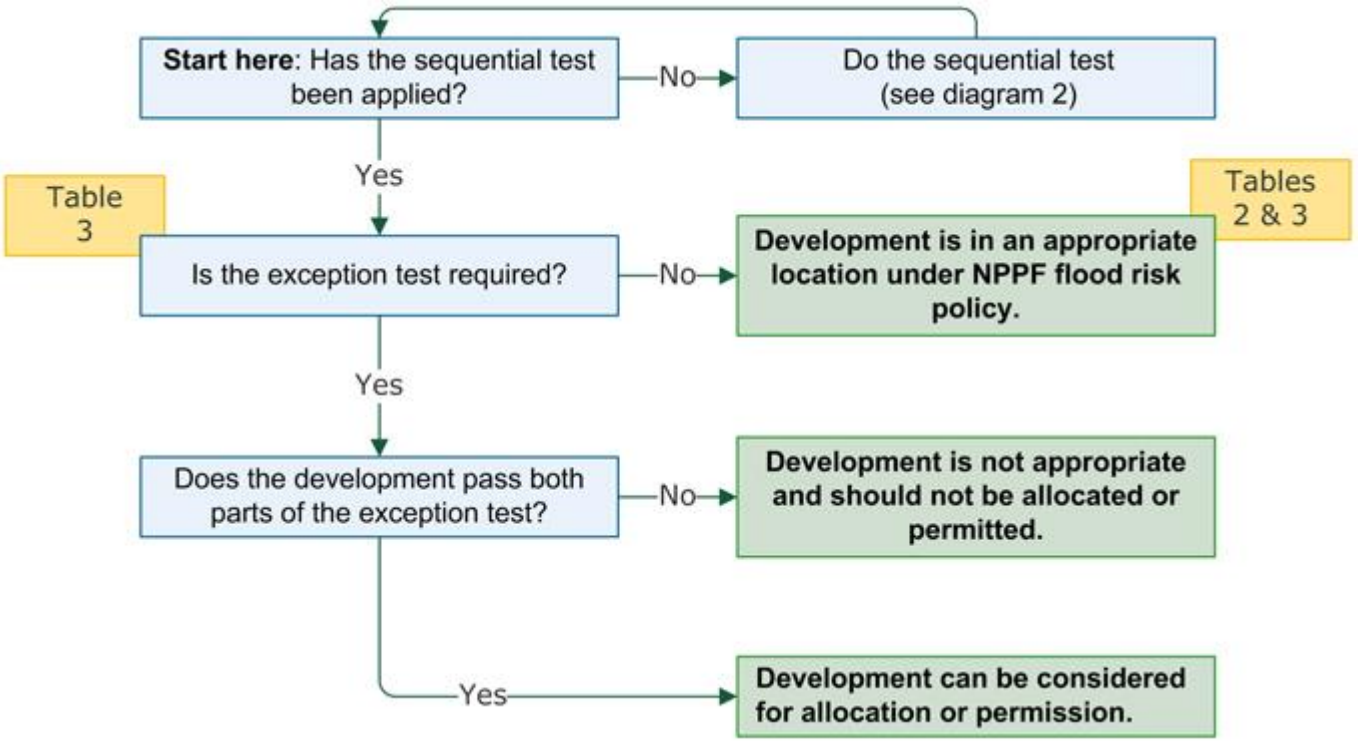
Residential development should be considered for a minimum of 100 years, unless there is specific justification for considering a shorter period. For example; the time in which flood risk or coastal change is anticipated to impact on it, where a development is controlled by a time-limited planning condition.

The lifetime of a non-residential development depends on the characteristics of that development. Planners should use their experience within their locality to assess how long they anticipate the development being present for. Developers would be expected to justify why they have adopted a given lifetime for the development, for example, when they are preparing a site-specific flood risk assessment. The impact of climate change needs to be taken into account in a realistic way and developers, the local planning authority and Environment Agency should discuss and agree what allowances are acceptable.

10. Applying the Exception Test in the Preparation of a Local Plan

This is summarised in diagram 3 (below). The Exception Test should *only* be applied as set out in Table 3 above and following application of the Sequential Test. Also see Table 2 above.

Diagram 3: Application of the Exception Test to Local Plan preparation (source PPG)



11. When Should the Exception Test be Applied to Planning Applications?

The Exception Test should *only* be applied as set out in Table 3 above following application of the Sequential Test. An applicant will need to show that both elements of the Test, as set out in paragraph 102 of the National Planning Policy Framework, can be satisfied.

12. Does the Exception Test Need to be Applied in Areas Requiring Redevelopment or Regeneration?

If the Sequential Test to locate development where there is a lower risk of flooding has been applied within an area subject to redevelopment or regeneration, the applicant may also need to show that the Exception Test is passed for particular developments within the regeneration area in the circumstances set out in Table 3 above. As the site is part of a regeneration strategy it is very likely that it will provide the wider sustainability benefits to pass the first part of the Exception Test. The developer still needs to show that the development will be safe and will not increase flood risk elsewhere.

Appendix 2

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

The text below is based on the Highways Maintenance Plan of 2008 – 09. Whilst this is the current document at the time of the development of this SFRA it will be replaced by a reviewed version by January 2018.

1. 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.

Highways Asset Management webpage is as below:

http://www.lancashire.gov.uk/council/strategies-policies-plans/roads-parking-and-travel/highway-asset-management-in-lancashire

2. 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.

The Highways Authority also has a Gully Cleaning policy adopted April 2017 which prioritises problem gullies for regular scheduled inspections.

The Highways Authority are also developing a Trash Screens Policy which is hoped will be in place by summer 2017.

Details of both the above are available through the Asset Management webpage link mentioned above

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.

3. Highway Drainage Systems Maintenance Categories

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

- Drainage Cleaning
- Drainage Repairs

4. 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.

5. 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.

The Authority are also collecting flood risk assets that may affect businesses and Domestic properties, so concentrating on the main urban areas and strategic corridors at present. These assets are recorded on the LCC Flood Risk pages on the internet.

http://www.lancashire.gov.uk/council/strategies-policies-plans/environmental/lancashire-and-blackpool-flood-risk-management-strategy.aspx

Appendix 3 - FRA Guidance (source PPG)

This pro-forma should be completed and submitted with the planning application for developments for which a Flood Risk Assessment (FRA) is required. 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.

Site-Specific Flood Risk Assessment: CHECKLIST (Source: PPG Flood Risk and Coastal Change Para 26)

1 - Development Site and Location

You can use this section to describe the site you are proposing to develop. It would be helpful to include, or make reference to, a location map which clearly indicates the development site.

a. Where is the development site located? (eg postal address or national grid reference)

b. What is the current use of the site? (eg undeveloped land, housing, shops, offices)

c. Which Flood Zone (for river or sea flooding) is the site within? (ie Flood Zone 1, Flood Zone 2, Flood Zone 3). As a first step, you should check the Flood Map for Planning (Rivers and Sea). It is also a good idea to check the Strategic Flood Risk Assessment for the area available from the local planning authority.

2 - Development Proposals

You can use this section to provide a general summary of the development proposals. It would be helpful to include, or make reference to, an existing block plan and a proposed block plan, where appropriate.

a. What are the development proposal(s) for this site? Will this involve a change of use of the site and, if so, what will that change be?

b. In terms of vulnerability to flooding, what is the vulnerability classification of the proposed development? See Table 2 of this guidance for an explanation of the vulnerability classifications.

c. What is the expected or estimated lifetime of the proposed development likely to be? (eg less than 20 years, 20-50 years, 50-100 years?). See paragraph 026 of this guidance for further advice on how to assess the lifetime of developments for flood risk and coastal change purposes. (It may also be advisable to seek advice from the local planning authority).

3 - Sequential Test

For developments in flood zones 2 or 3 only. (If the development site is wholly within flood zone 1, you can skip this section and go to section 4).

You can use this section to describe how you have applied the sequential test (if needed as set out in paragraphs 101-104 of the National Planning Policy Framework) to the proposed development, and the evidence to demonstrate how the requirements of the test have been met. See paragraph 033 of this guidance for further information. (You are advised to contact the local planning authority to confirm whether the sequential test should be applied and to ensure the appropriate level of information is provided).

a. What other locations with a lower risk of flooding have you considered for the proposed development?

b. If you have not considered any other locations, what are the reasons for this?

c. Explain why you consider the development cannot reasonably be located within an area with the lowest probability of flooding (flood zone 1); and, if your chosen site is within flood zone 3, explain why you consider the development cannot reasonably be located in flood zone 2. See Table 1 for definitions of the flood zones.

d. As well as flood risk from rivers or the sea, have you taken account of the risk from any other sources of flooding in selecting the location for the development?

4 - Climate Change

How is flood risk at the site likely to be affected by climate change? (The local planning authority's Strategic Flood Risk Assessment should have taken this into account). Further advice on how to take account of the impacts of climate change in flood risk assessments is available from the Environment Agency.

5 - Site Specific Flood Risk

You can use this section to describe the risk of flooding to and from the proposed development over its expected lifetime, including appropriate allowances for the impacts of climate change. It would be helpful to include any evidence, such as maps and level surveys of the site, flood datasets (eg flood levels, depths and/or velocities) and any other relevant data, which can be acquired through consultation with the Environment Agency, the lead local flood authority for the area, or any other relevant flood risk management authority. Alternatively, you may consider undertaking or commissioning your own assessment of flood risk, using methods such as computer flood modelling.

a. What is/ are the main source(s) of flood risk to the site? (eg tidal/sea, fluvial or rivers, surface water, groundwater, other?). You should consider the flood mapping available from the Environment Agency, the Strategic Flood Risk Assessment for the area, historic flooding records and any other relevant and available information.

b. What is the probability of the site flooding, taking account of the maps of flood risk available from the Environment Agency, the local planning authority's Strategic Flood Risk Assessment and any further flood risk information?

c. Are you aware of any other sources of flooding that may affect the site?

d. What is the expected depth and level for the design flood? See paragraph 055 of this guidance for information on what is meant by a "design flood". If possible, flood levels should be presented in metres above Ordnance Datum (ie, the height above average sea level).

e. Are properties expected to flood internally in the design flood and to what depth? Internal flood depths should be provided in metres.

f. How will the development be made safe from flooding and the impacts of climate change, for its lifetime? Further information can be found in paragraphs 054 and 059 (including on the use of flood resilience and resistance measures) of this guidance.

g. How will you ensure that the development and any measures to protect the site from flooding will not cause any increase in flood risk off-site and elsewhere? Have you taken into account the impacts of climate change, over the expected lifetime of the development? (eg providing compensatory flood storage which has been agreed with the Environment Agency).

h. Are there any opportunities offered by the development to reduce the causes and impacts of flooding? See paragraph 050 of this guidance for further advice.

6. Surface Water Management *

You can use this section to describe the existing and proposed surface water management arrangements at the site using sustainable drainage systems wherever appropriate, to ensure there is no increase in flood risk to others off-site.

a. What are the existing surface water drainage arrangements for the site?

b. If known, what (approximately) are the existing rates and volumes of surface water run-off generated by the site?

c. What are the proposals for managing and discharging surface water from the site, including any measures for restricting discharge rates? For major developments (eg of 10 or more homes or major commercial developments), and for all developments in areas at risk of flooding, sustainable drainage systems should be used, unless demonstrated to be inappropriate – see paragraphs 079-086 of this guidance for further advice.

d. How will you prevent run-off from the completed development causing an impact elsewhere?

e. Where applicable, what are the plans for the ongoing operation and/or maintenance of the surface water drainage systems?

7. Occupants and Users of the Development

You can use this section to provide a summary of the numbers of future occupants and users of the new development; the likely future pattern of occupancy and use; and proposed measures for protecting more vulnerable people from flooding.

a. Will the development proposals increase the overall number of occupants and/or people using the building or land, compared with the current use? If this is the case, by approximately how many will the number(s) increase

b. Will the proposals change the nature or times of occupation or use, such that it may affect the degree of flood risk to these people? If this is the case, describe the extent of the change.

c. Where appropriate, are you able to demonstrate how the occupants and users that may be more vulnerable to the impact of flooding (eg residents who will sleep in the building; people with health or mobility issues etc) will be located primarily in the parts of the building and site that are at lowest risk of flooding? If not, are there any overriding reasons why this approach is not being followed?

8. Exception Test

You can use this section to provide the evidence to support certain development proposals in flood zones 2 or 3 if, following application of the sequential test, it is appropriate to apply the exception test, as set out in paragraphs 102-104 of the National Planning Policy Framework. See paragraph 035 of this guidance for further information on the exception test. It is advisable to contact the local planning authority to confirm whether the exception test needs to be applied and to ensure the appropriate level of information is provided.

a. Would the proposed development provide wider sustainability benefits to the community? If so, could these benefits be considered to outweigh the flood risk to and from the proposed development? See paragraph 037 of this guidance for further information.

b. How can it be demonstrated that the proposed development will remain safe over its lifetime without increasing flood risk elsewhere? See paragraph 038 of this guidance for further information.

c. Will it be possible to for the development to reduce flood risk overall (eg through the provision of improved drainage)? See paragraph 050 for further advice.

9. Residual Risk

You can use this section to describe any residual risks that remain after the flood risk management and mitigation measures are implemented, and to explain how these risks can be managed to keep the users of the development safe over its lifetime. See paragraph 042 of this guidance for more information.

a. What flood related risks will remain after the flood risk management and mitigation measures have been implemented?

b. How, and by whom, will these risks be managed over the lifetime of the development? (eg putting in place flood warning and evacuation plans).

10. Flood Risk Assessment Credentials

You can use this section to provide details of the author and date of the flood risk assessment.

a. Who has undertaken the flood risk assessment?

b. When was the flood risk assessment completed?

11. Other Considerations

Managing surface water

The site-specific flood risk assessment will need to show how surface water runoff generated by the developed site will be managed. In some cases it may be advisable to detail the surface water management for the proposed development in a separate drainage strategy or plan. You may like to discuss this approach with the lead local flood authority (see paragraph 006 of this guidance).

Surface water drainage elements of major planning applications (eg of 10 or more homes) are reviewed by the lead local flood authority for the area. As a result, there may be specific issues or local policies, for example the Local Flood Risk Management Strategy or Surface Water Management Plan, that will need to be considered when assessing and managing surface water matters.

It is advisable to contact the appropriate lead local flood authority prior to completing the surface water drainage section of the flood risk assessment, to ensure that the relevant matters are covered in sufficient detail.

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. <u>Upper Ribble and Hodder</u>

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 wastewater 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

<u>Action 1</u> (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
<u>Action 2</u> (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. <u>Bowland Fell</u>

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.

<u>Action 1.</u> (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)

<u>Action 2</u> (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. <u>Clitheroe</u>

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.

<u>Action 1</u> (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. Lower Ribble

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 Estuary 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 - North West River Basin Flood Risk Management Plan Section 3.6

1. Introduction to the Ribble Catchment

The Ribble catchment drains an area of 1490km^2 in North Yorkshire/Lancashire from Settle in the North to Preston and Blackburn in the South. The principal river in the catchment is the River Ribble, which rises in the Yorkshire Dales and flows south westwards towards the Ribble estuary downstream of Preston. The Ribble has three main tributaries; the River Hodder which drains much of the Forest of Bowland Area of Outstanding Natural Beauty, the River Calder which flows through industrial east Lancashire towns and the River Darwen which joins the Ribble on the outskirts of Preston from the south.

Other main watercourses include the coastal streams entering the northern shore of the Ribble estuary from the Lytham St Anne's area and some western parts of Blackpool. One of these streams, Main Drain, is pumped; others drain into the Ribble estuary via tidal flapped outlets. The total length of Main Rivers draining the catchment is 445km.There are also three canal systems in the catchment, the Leeds and Liverpool Canal, the new Ribble Link Canal and a short section of the Lancaster Canal.

2. Land Use and Management

Most of the Ribble catchment is rural, with the majority of agricultural land being used for dairy farming and cattle grazing. Extensive arable production is generally confined to the better quality soils found on the Southern Fylde peninsula between Preston and Blackpool.

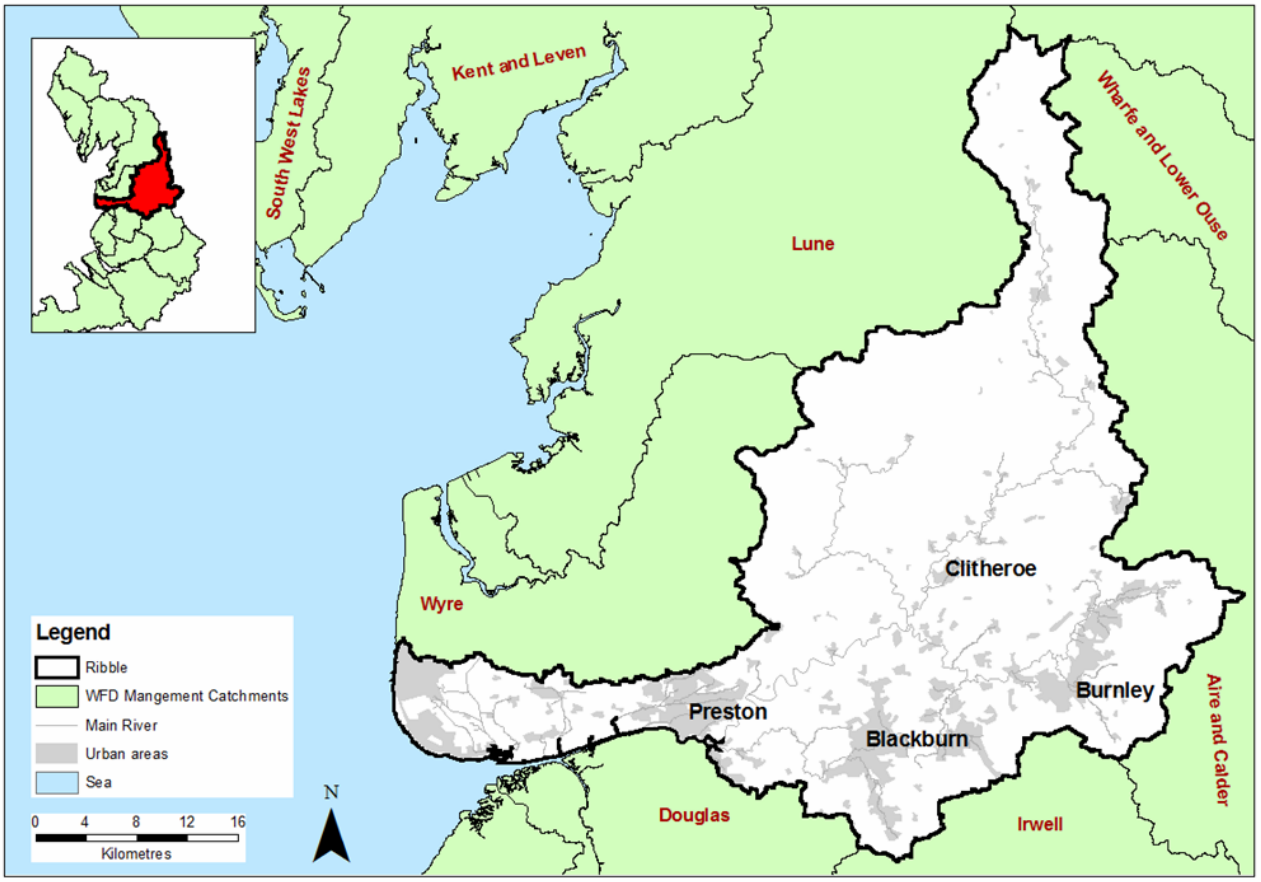


Figure 23 Overview map of the Ribble catchment

Large urban areas are concentrated in the southern part of the catchment, with Clitheroe being the only large town in the more rural north. Major urban areas, such as Preston, Blackburn, Burnley and smaller towns such as Colne, Darwen, Nelson and Accrington have been identified for housing growth and renewal. Watercourses and coastal areas in the catchment are used for a variety of purposes including recreation and tourism. The catchment contains communication routes that are of both regional and national importance and by necessity they cross many rivers and watercourses. The catchment contains three motorways: the M65, M6 and a short section of the M55 between Preston and Blackpool. The West Coast Mainline railway also passes through Preston.

3. **Geology**

The northern area of the catchment is underlain by Carboniferous Limestone, classed as a minor aquifer being important for water supplies and generation of baseflow to rivers. The south eastern area of the catchment is broadly underlain by Millstone Grit (sandstone) which combined with overlying soils tend to generate rapid flow to watercourses. To the south west, the lower Ribble is underlain by Permo-Triassic Sandstones, classed as a major aquifer which can support abstraction for water supply to the public. The low lying coastal zone around Lytham St Annes consists of Triassic Mudstone (a non-aquifer).

The catchment is characterised by high levels of bank erosion and coarse sediment bed material in its upper and mid-catchment, and high levels of silt deposition in its tidal reaches.

4. National and International Designations

The Ribble Estuary is of international nature conservation importance being designated as a Special Protection Area (SPA) and an internationally important wetland (Ramsar site) as well as being a Site of Special Scientific Interest (SSSI), and parts are designated as a National Nature Reserve (NNR). The estuary is also well established as an Important Bird Area, a designation which recognises the international importance of the estuary in supporting populations of waterfowl.

The catchment contains three other internationally designated sites for nature conservation – Bowland Fells SPA, South Pennines Moors SPA and Special Area of Conservation (SAC), and the Ingleborough Complex SAC. The catchment also contains multiple Sites of Special Scientific Interest.

The Yorkshire Dales National Park which has outstanding scenery and a rich cultural heritage, and the Forest of Bowland Outstanding Area of Natural Beauty (AONB), known for its unspoiled and richly diverse landscapes, both cover parts of the catchment.

5. Partnership Working

Within the Ribble Catchment, Risk Management Authorities have developed a good working relationship with our partners. The catchment is covered by eleven local councils; Blackburn with Darwen, Blackpool, Burnley, Chorley, Craven, Fylde, Hyndburn, Pendle, Preston, Ribble Valley and South Ribble, plus the Lead Local Flood Authority Lancashire County Council.

United Utilities are the water and sewerage provider in this catchment and they actively participate in partnership working to identify and address flood risk issues within the Ribble catchment.

In addition to those partners mentioned the Environment Agency also works closely with the Regional Flood and Coastal Committee and Natural England.

Linking with the North West River Basin Management Plan

The North West River Basin Management Plan (RBMP) sets out the measures needed to improve protected areas and to prevent deterioration or improve status in other water bodies.

The programme of measures includes the measures with agreed funding that will be implemented by 2021.

Measures in the Ribble Management catchment include: Water Company investment programme; Flood Risk Management investment programme; catchment level government funded improvements;

for example, funding from the flood risk management investment programme has been secured to deliver mitigation measures in water bodies designated for flood protection. This will move the status of a few water bodies in this catchment towards good ecological potential.

Examples of funded measures identified in the NW RBMP that will deliver WFD improvements in this catchment include water company investment to deliver water quality improvements in the River Hodder, the River Darwen, Colne Water and the River Calder.

Further information on the main programmes of measures can be found in the RBMP. You can access the plan and associated documents though the river basin management web pages (https://www.gov.uk/government/collections/river-basin-management-plan-update).

Additional measures are required for water bodies to meet WFD objectives. These measures are summarised in the RBMP as measures to achieve objectives for 2027 and beyond. Although funding has not been secured for these measures, we will work across the Environment Agency and with external partners to identify opportunities to implement these measures.

Measures required across the North West River Basin district include those to address diffuse agricultural pollution; diffuse urban pollution; point source discharges; and mitigation measures in heavily modified water bodies. To implement these measures it would require support from a range of sectors including local and central government, agriculture and farming, urban and transport and the water industry.

Further information on these measures can be obtained from the Environment Agency at CMBLNCInfoRequests@environment-agency.gov.uk.

Flood risk maps and statistics **Flooding from Rivers and the Sea**

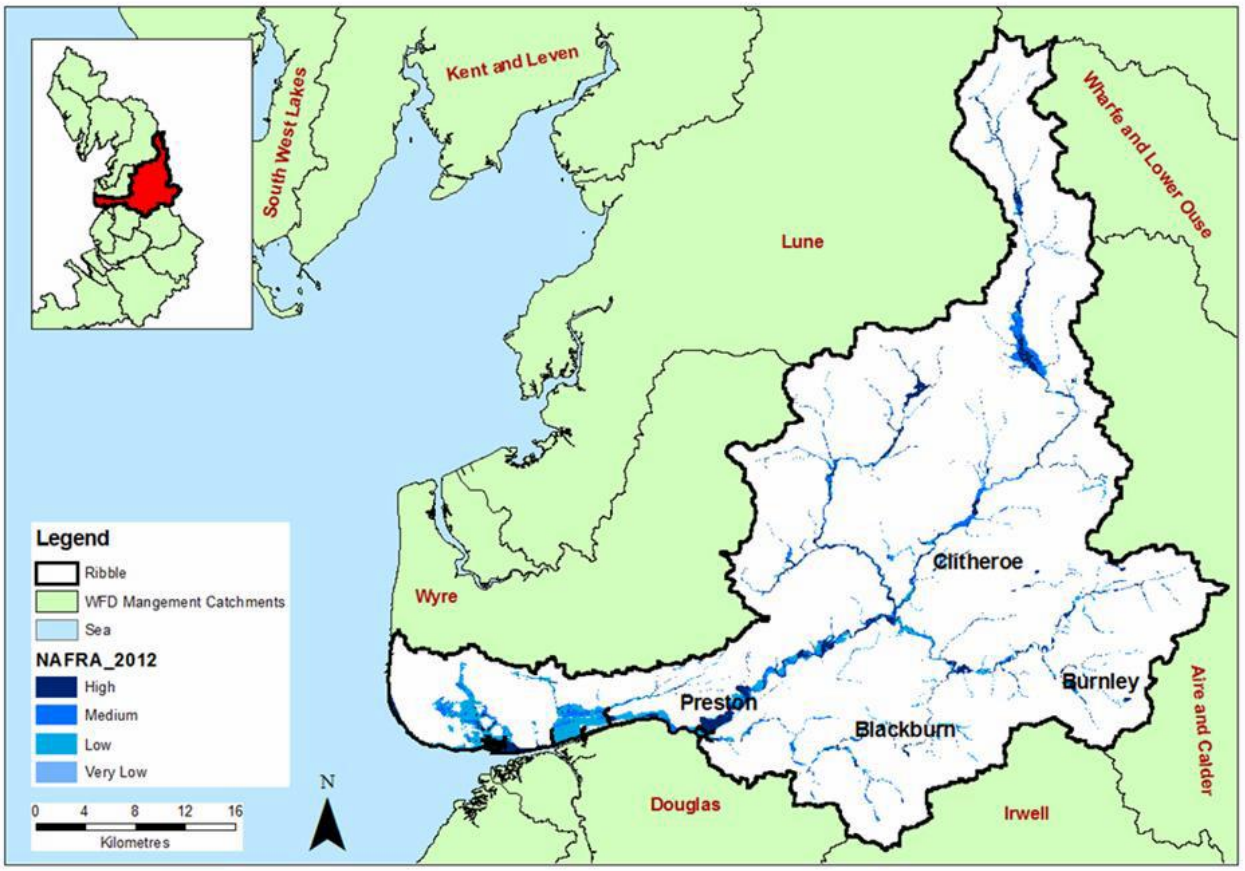


Figure 24 National Flood Risk Assessment (NAFRA) in the Ribble catchment

Table 14 Summary flood risk from rivers and sea to people, economic activity and the natural and historic environment across the Ribble Catchment.

River and Sea	Total in Catchment	High risk	Medium risk	Low risk	Very low risk
Risk to people:					
Number of people in area:	778,800	5,350	7,100	20,100	<50
Number of services:	1,230	30	20	50	0
Risk to economic activity:					
Number of non-residential properties:	74,950	1,000	1,350	3,150	0
Number of airports:	1	0	0	0	0
Length of roads (km):	410	<10	<10	10	0
Length of railway (km):	180	<10	<10	<10	0
Agricultural land (ha):	34,000	1,600	1,250	2,400	<50
Risk to the natural and historic environment:					
Number of EU designated bathing waters within 50m:	1	1	0	0	0
Number of EPR installations within 50m:	61	3	0	4	0
Area of SAC within area (ha):	3,800	<50	<50	<50	0
Area of SPA within area (ha):	9,500	350	<50	<50	<50
Area of RAMSAR site within area (ha):	350	350	<50	<50	0
Area of World Heritage Site within area (ha):	0	0	0	0	0
Area of SSSI within area (ha):	13,600	500	100	100	0
Area of Parks and Gardens within area (ha):	850	<50	<50	<50	<50
Area of Scheduled Ancient Monument within area (ha):	100	<50	<50	<50	0
Number of Listed Buildings within area:	2,570	100	40	100	0
Number of Licensed water abstractions within the area:	280	30	20	10	0

Over 32,000 people are at risk of flooding from rivers and the sea in the Ribble Catchment, representing approximately 4% of the total population within the catchment. Approximately 5500 non-residential properties are at risk of flooding in the Ribble catchment. Approximately 16% of the agricultural land within the catchment is at risk of flooding from Rivers and the Sea. Approximately
7% of SSSI sites are at risk of flooding in the area. There are no airports at risk of flooding in the catchment.

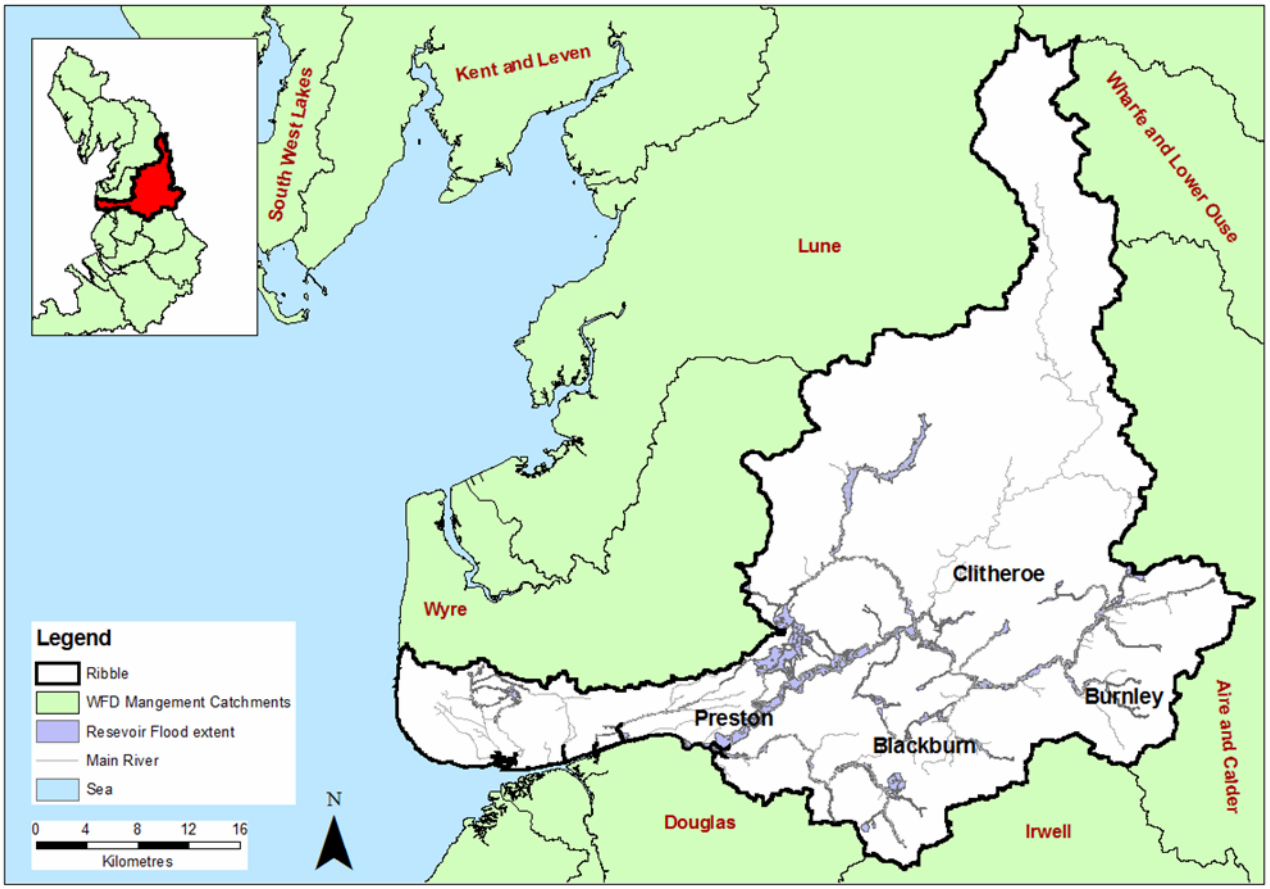


Figure 25 Reservoir flood risk extents in the Ribble Catchment.

Flooding from Reservoirs

Table 15 Summary flood risk from reservoirs to people, economic activity and the natural and historic environment across the Ribble Catchment.

Reservoirs	Total in Catchment	Maximum extent of flooding
Risk to people:		
Number of people in area:	778,800	25,300
Number of services:	1230	110
Risk to economic activity:		
Number of non-residential properties:	74,950	5,000
Number of airports:	1	0
Length of roads (km):	410	20
Length of railway (km):	180	<10
Agricultural land (ha):	34,000	3,900
Risk to the natural and historic environment:		
Number of EU designated bathing waters within 50m:	1	0
Number of EPR installations within 50m:	61	7
Area of SAC within area (ha):	3,800	<50

Reservoirs	Total in Catchment	Maximum extent of flooding
Area of SPA within area (ha):	9,500	<50
Area of RAMSAR site within area (ha):	350	0
Area of World Heritage Site within area (ha):	0	0
Area of SSSI within area (ha):	13,600	<50
Area of Parks and Gardens within area (ha):	850	<50
Area of Scheduled Ancient Monument within area (ha):	100	<50
Number of Listed Buildings within area:	2,570	250
Number of Licensed water abstractions within the area:	280	40

Over 25,000 people are at risk of flooding from reservoirs, equating to 3% of the total population within the catchment. Approximately 5,000 non-residential properties are at risk of flooding from reservoirs in the Ribble catchment. Approximately 11% of the agricultural land within the catchment is at risk of flooding from reservoirs.

6. Conclusions for the Ribble Catchment

The Ribble Catchment covers a mix of urban and rural areas, with different land uses, population densities and types of watercourse.

Flood risk within the catchment is from a variety of sources; rivers, the sea, surface water, ordinary watercourses, sewers and reservoirs. There are more than 32,500 people at risk of flooding from rivers and the sea.

The River Ribble catchment includes the upstream River Calder and the River Darwen catchments. The main flood risk in the upstream catchments is fluvial; however the downstream areas of the River Ribble in Preston are at risk from both fluvial and tidal events. The Environment Agency are currently proposing to construct two flood alleviation schemes in Blackburn, on the River Blakewater and the River Darwen. This involves replacing and raising the existing floodwalls. The Environment Agency have recently completed a large deculverting scheme in Darwen as well as culvert clearing and strengthening works following two flood events.

Significant flooding occurred in December 2015 in the Ribble catchment caused by storms Desmond and Eva when heavy rainfall fell on already saturated ground across the North West. Parts of the Ribble catchment received five times the amount of rainfall it would normally receive in an average December. Far Gearstones at Ribblehead recorded over 880mm of rainfall in December 2015 when the average is 180mm. The December storms were estimated to be events with a return period of between a 1 in 75 and 1 in 100 (1.3% - 1%) chance of occurring in any given year. In Whalley and Padiham this was closer to a 1 in 1,000 (0.1%) chance of occurring in any given year (this data is taken from several gauging stations in the Ribble catchment, the return period information is likely to be revised but is correct as at January 2016). At Samlesbury, the River Ribble peaked at 6.953m on the 26th December, which is the highest on record. Most rivers in the Ribble catchment set new river level records over Christmas 2015.

The December 2015 flooding affected communities such as Billington, Whalley, Padiham, Ribchester, Clitheroe, Longridge, Brierfield, Nelson, Samlesbury, Higher Walton, Preston and Tickled Trout. In this catchment circa 350 homes and businesses flooded. Flooding cut off small communities and affected livestock and infrastructure including the M6 motorway.

Following the floods a programme of recovery is in place which includes a review of the options for the communities affected. Flood support officers have visited most of the affected communities. Assets are being reviewed and repaired and site visits and partnership working is ongoing to look at

options for future working. Planned and current flood risk schemes are being reviewed which is likely to change some priorities within the 6 year investment programme. Local drop in sessions were held to understand the sources of flooding and impacts on those communities. Future work will look at options for these communities to develop schemes and flood action groups that protect a greater number of properties affected by this event. All measures for the Ribble catchment are contained in Part C.

The Shoreline Management Plan for the North West coast, which was completed in 2010, sets out how coastal erosion can be managed sustainably and also sets the direction for managing coastal flood risk. This Flood Risk Management Plan summarises some of that information but in no way changes the approach developed then with the aid of substantial consultation. More recent climate change projections suggest that future sea level rise considered by the SMP may be reasonable or conservative.

Economic growth and development in Pendle and Blackburn could present funding opportunities if complimentary options can be identified to reduce flood risk and allow development. The Environment Agency will continue to work with the Local Enterprise Partnership to identify locations and solutions.

Catchment Flood Management Plans published in 2008 considered possible increases in flood levels, extent and risk if climate change were to increase flood flows by 20%. Climate projections since then (UKCP 2009) suggest flood flows could increase by more than that but acknowledge significant uncertainty. The corresponding allowance as detailed in Section 5 of Part is now for a 30 - 70% increase in flow in North West rivers. This depends on which scenario is used and the date range to be applied (2040 – 2069, or 2070 to 2115). Population increase and urban creep (trend for paving of driveways and similar) will further compound the increased flood risk predicted due to the changing climate. The Environment Agency is willing to work with Local Planning Authorities to help identify areas which may be most affected. However, this work is likely to fall short of extensive hydraulic modelling and detailed mapping of theoretical flood extents. The headline message is therefore:

Flood risk is increasing, perhaps substantially, so Planners, Emergency Planners, Asset Managers and others will need to mitigate this through a mix of collaborative working, planning policies, use of 'worst case' scenarios, development of contingency plans and some detailed analysis.

Flood risk from 'local sources' and sewers is not included in any detail in this Catchment Summary, or in others. Local sources are surface water, groundwater and ordinary watercourses. Flood risk from these sources is managed by Lead Local Flood Authorities Sewer flood risk is managed by United Utilities and is not required to be included in FRMPs. Outside the two significant flood risk areas of Greater Manchester and Liverpool & Sefton there is no statutory duty to provide details in the FRMP of local flood risk. Local Flood Risk Management Strategies produced by LLFAs are the principal source of information for local flood risk – see Annex 2; Sources of objectives and measures. Part A of the FRMP includes some information provided voluntarily by LLFAs and United Utilities and so provides a useful overview for all sources of flood risk across the whole
River Basin District.

Measures across the Ribble Catchment

Across the Ribble Catchment there are a total of 41 measures from earlier plans to manage flood risk; some examples are listed below. For the full list of measures please see Annex 1 of the FRMP.

Preventing risk: 2 measures

- *Grimsargh, Preston - Ex-Critical Ordinary Watercourse with poor conveyance & insufficient culvert capacity. Appraisal to investigate how risk can be reduced.*
- *The Wrangling, Blackburn - The Blackburn and Darwen Strategy Study confirmed that blocking the entrance to the Ambulance culvert by 50% increases the water level in the upstream channel, resulting in flood waters leaving the channel at the culvert entrance. Ambulance St & Harrison St. Investigate options to reduce flood risk.*

Preparing for risk: 9 Measures

- *Implement improvements in flood warning and flood response. This should include the promotion of the existing formal flood warning areas covering Burnley, Barrowford, Whalley, and Lomeshaye, as well as implementing the new flood warning area of Padiham. 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.*
- *Depending on strategy review, undertake project appraisal for Fairhaven Lake CoastProtection Scheme followed by detailed design and construction.*
- *Develop estuary flood risk management strategy taking into account the estuary wide studies to provide more detailed proposals on approaches to the delivery of policy across the estuary and a programme of actions to deliver it. The estuary strategy needs to link to the open coast strategy being developed between Anchorsholme and Naze Point.*
- *Undertake studies to investigate Managed Realignment opportunities in the medium to long term. Investigate the hazard that the landfill site poses to people and the environment from leaching or the release of contaminated materials. Where necessary, consider protection in situ or excavation and removal of material.*
- *Seek opportunities for habitat enhancements during strategy development as part of flood/erosion risk management works*

Protecting from risk*:* 30 Measures

- *Identify structures which cause flow restrictions or flow obstructions in the policy unit, and prioritise structures for replacement / redesigning / removal according to their flood risk. This list should focus on culverted stretches of the Rivers Blakewater and Darwen in Blackburn, as well as stretches highlighted in the Darwen strategy such as Clough Street culvert, Ambulance culvert, Aqueduct culvert.*
- *Develop strategy, subject to prioritisation and funding, to address flood risk within Preston, Fulwood, Cadley,and Walton-le-Dale. The strategy should include modelling of flood risk scenarios in and around Preston to identify the major areas at risk and a cost-benefit analysis for the installation of defences in the future.*
- *River Darwen, Darwen - Much of the watercourse is heavily culverted through the town and 1 in 50 lead to flooding. Investigations into raising the existing standard are required in particularly Waterfall area.*
- *Kirk Beck, Bolton By Bowland - Bolton by Bowland is a small village in rural Lancashire with a long history of flooding problems. A modelling report carried out in 2007 shows specific areas where SoS needs raising to improve the integrity of the flood defences. Currently properties are affected by a 5yr event with up to 28 high value residential properties affected in a 1 in 100yr event.*
- *Trawden Brook, Trawden - The flood risk reach was part of the Burnley Nelson and Colne FRM strategy area 69 properties are at risk of flooding in a 1 in 75 year event. The preferred option is to raise defences to protect against a 1in 75 year event. Works would involve constructing new flood walls and repairing existing walls.*

Recovery and review of risk: there are no measures proposed over and above existing flood risk work.

The measures above represent the catchment specific flood risk management measures. Please refer back to Part A of the FRMP to see the measures that apply to the entire or large parts of the RBD.