

West Lancashire Borough Council

Local Development Framework



Strategic Flood Risk Assessment

2010

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1.0 Introduction

Strategic Flood Risk Assessments

- 1.1 Strategic Flood Risk Assessments fit into a hierarchy of flood risk assessments that are now a requirement through both the Water Framework Directive and CLG guidance contained in PPS25. Such assessments are designed to identify areas of flood risk, to manage that risk and to ensure future development is located in those areas at lowest risk of flooding, where possible. The development of a Strategic Flood Risk Assessment will be a useful background document promoting sustainable development through the Local Development Framework.
- 1.2 This document is an update to the original Strategic Flood Risk Assessment published in 2007.
- 1.3 The highest tier within the hierarchy is 'River Basin Management Plans' which are developed for each river basin within England and Wales. Such Plans are high level, strategic documents and will confirm the environmental objectives for each water body within the basin and summarise the programme of measures needed to achieve them.
- 1.4 Catchment Management Plans, along with Shoreline Management Plans, provide greater detail on fluvial and coastal flooding risks. Both types of plan aim to develop flood-risk management policies that can be implemented on the catchment as a whole.
- 1.5 Strategic Flood Risk Assessment sits at the lowest level of the strategic plan hierarchy and involves the assessment of flood risk at the local level. The assessment process involves the collection of relevant data to identify areas of flood risk and development pressure. Development pressures can then be compared to flood risk to ensure that new development is directed towards the low risk areas in the first instance, in accordance with the Sequential approach set out in PPS25.
- 1.6 Within PPS25, which relates to Development and Flood Risk, a key requirement is for local authorities to develop a Strategic Flood Risk Assessment for their authority area. Within PPS25 it states that:

“Local Planning Authorities (LPA’s) should prepare SFRA’s in consultation with the Environment Agency to determine the variations in flood risk across and from their area as the basis for preparing appropriate policies for flood risk management for these areas and enable local authorities to determine the acceptability of flood risk in relation to emergency planning capability. The SFRA should either form part of the Sustainability Appraisal for Local Development Documents (LDDs), or be used to inform it and will inform the sequential approach to flood risk in the development allocation and development control process.”

2.0 Methodology

- 2.1 The SFRA has been divided into two stages. Stage one will relate to the collection of data on flooding issues, defining the flood risk areas and identifying development pressures within the Borough. Within the second stage of the study, which will only be conducted for specific areas at risk of flooding that are proposed for development, consideration will be given to more detailed modelling works of the flood risk posed to that site and to the surrounding areas.

Stage One of the SFRA

- 2.2 Through discussions with the Environment Agency (NW), a brief summary has been produced outlining the matters that the Environment Agency wish to be considered within an SFRA. The summary has been based on best practice guidance produced jointly by the Environment Agency and North West Regional Assembly.
- 2.3 Data Collection is identified as a key aspect of an SFRA. The review of relevant data sources will assist in identifying those areas within the local authority that are at high, medium or low risks of flooding and what the sources of flooding are. Relevant data sources are considered as:
- National Flood and Coastal Defence Database (NFCDD)
 - Section 105 Surveys
 - Catchment Flood Management Plans
 - Flood Maps
 - Defended Areas
 - Asset surveys / condition / crest heights
 - Culvert surveys / reports / condition
 - Other structure acting as defences
 - Topographic Surveys
 - Known or possible non-fluvial sources of flooding e.g. groundwater, sewer surcharges, canals, reservoirs etc.
- 2.4 The collation of as much relevant data as possible will assist in identifying high, medium or low flood risk areas. Areas that are protected by some form of flood defence should still be considered 'at risk' as should the defence fail or be overtopped significant flooding is still possible.
- 2.5 The SFRA also requires local authorities to identify the main areas of development pressure within the Borough. Such pressure could result from the Council allocating land for future development through the Local Development Framework, or known focuses of development where the future potential for development is great.
- 2.6 The development of such robust evidence base should provide the Borough Council with adequate information on whether a site is at risk of flooding.

Stage Two of the SFRA

- 2.7 All development proposals require screening to ensure that the issues of flooding and flood risk have been properly addressed. If development is proposed on a site which, through assessment of data compiled through Stage 1 of the SFRA process, is considered to be in a high or medium flood risk area, then further detailed work will be required to demonstrate that the development could not reasonably be located in an area at a lower risk of flooding, that the development is appropriate for the location and that it will not be at an unacceptable risk of flooding. Further assessments may also be required for developments that may impact on surface water run-off and lead to an increase in flood risk elsewhere.

- 2.8 Stage 2 of the SFRA will represent a more detailed assessment of flood risk and will be required when:
- a) The Borough Council is seeking to allocate a specific site within a flood risk area for future development through the Local Development Framework; and
 - b) A developer / landowner submits development proposals for a windfall sites which is within a flood risk area.
- 2.9 Any mitigation measures put forward should be in accordance with guidelines set out within PPS25.

3.0 Data Collection

3.1 River Basin Management Plans (RBMPs)

- 3.1.1 The River Basin Management Plan for the North West was published by the Environment Agency in December 2009. The plan sets out the pressures facing the water environment in the North West River Basin District and the actions needed to address them. It has been prepared under the Water Framework Directive as the first of a series of 6-year cycles of planning and action.
- 3.1.2 The key River Basin District catchment areas that will have the greatest potential impact on West Lancashire relate to the Rivers Wyre, Ribble, Douglas and Alt Crossens. The RBMP sets out how the management plan for the North West will be implemented in these areas, including the promotion of habitat creation schemes along the Ribble (and Estuary) for flood risk and biodiversity purposes.

3.2 Catchment Flood Management Plans (CFMP)

- 3.2.1 Following the production of the initial Inception Reports (2005) and Scoping Reports (2007), the Environment Agency published a variety of Catchment Flood Management Plans in December 2009, detailing how the different areas will affect the Borough. Catchment areas are separate areas of land that collect precipitation and drain naturally into a single river system. A flood management plan has been prepared for each catchment area.

Alt / Crossens Catchment Flood Management Plan

- 3.2.2 The Alt/Crossens catchment area includes a significant proportion of the western part of the Borough, including Ormskirk, western parts of Burscough and Banks.
- 3.2.3 The CFMP highlights that reported incidents of flooding in the Alt/Crossens catchment are limited. Only four localised flood incidents have been reported on the Alt (none of which were located in West Lancashire) and no flooding incidents have been reported in the Crossens Catchment. However, it is recognised that there are a number of known localised flood risk sites, many of which occur on agricultural land, albeit of high grade, rather than any heavily urbanised areas.
- 3.2.4 The flood risk mechanisms within the Alt and Crossens CFMP area vary in relation to both the watercourse and location within the catchment. The tidal effects do not have much influence on the flooding mechanisms, provided that the tidal defences remain intact, as the tidal influence is restricted to downstream of the tidal barriers at Altmouth (Sefton) and Crossens pumping stations.
- 3.2.5 The main flood risk areas identified in the Alt catchment are primarily located outside West Lancashire, although Simonswood Brook is identified. In addition to this area other flooding within the Alt is limited to isolated urban areas (outside the Borough) with the exception of the agricultural flood risk at the location of the Cheshire Lines that results from a possible breach in defence.
- 3.2.6 Ormskirk is identified as a minor flood risk area in association with capacity issues and blockage of the culverts within Ormskirk, particularly the A59 culvert. The A59 and A570, in addition to three minor roads, would be at risk as well as potential risk to 30 hectares of grade 1 and 2 agricultural land. Flood risk management in this area focuses on river asset and channel maintenance activities.
- 3.2.7 The Crossens catchment is considered to have minimal flood risk in its current condition, limited primarily to Banks, Burscough and localised areas of Southport. Although these areas are at risk of flooding, this risk is limited to larger flood events,

with the majority of smaller risks being placed at a 1% Annual Probability Event (APE). The main potential flood risks within Crossens catchment are predominately associated with the failure of existing assets including:

- Inoperability of pumping stations, particularly Crossens pumping station in Banks
- Failure of existing coastal and tidal defences resulting in salt-water ingress.
- Failure of the embankment between Crossens Sluice and Banks Marsh Drain.

3.2.8 1500 hectares of high grade agricultural land are at risk in the area of, and around, Martin Mere and Mere Sands Wood, as well as the Southport to Wigan and Preston to Liverpool railway lines.

3.2.9 The CFMP concludes that the Crossens flood defence integrity is reliant upon the existing management approach adopted and has the potential for large scale flooding should the failure of any of the three assets above occur.

3.3.0 Douglas Catchment Flood Management Plan

3.3.1 The River Douglas catchment area includes a significant proportion of land to the east of the Borough and includes the settlement areas of Hesketh Bank, Tarleton, Rufford, Parbold and Appley Bridge.

3.3.2 The Report identified that the primary sources of flooding within the Douglas CFMP have been identified as rainfall, and, to a lesser extent sea level. There is no recorded flooding in the catchment related to snowmelt from the Pennine Areas.

3.3.4 The River Douglas joins the Ribble in an estuarine area and therefore storm surges, waves and tides are a potential source of flooding. The tidal limit of the River Douglas is at Rufford and this provides the upper limit to the area influenced by the sea. The only urban areas to be identified as being directly at risk from tidal flooding are areas of Hesketh Bank and parts of Appley Bridge.

3.3.5 Raised river defences have been constructed across much of the Douglas's reach to prevent flooding and the area now has a legacy of dependency on such defences, particularly within urbanised areas in Wigan. The Douglas CFMP contains 54 flood defence structures with a combined length of 50 kilometres, 55% of the total length is maintained by the Environment Agency with the remainder the responsibility of private landowners. Most of this length of privately owned defences (80%) lines the tidally effected reaches of the Douglas. In relation to such defences the Environment Agency have permissive powers to maintain the existing flood embankments as necessary.

3.3.6 Most of the man made, purpose built structures are located on the tidally influenced areas of the Douglas and Tawd (also on the Lostock and Yarrow outside West Lancashire) and within known flood risk areas. Concentrations of flood defences can be seen surrounding Hesketh Bank. These defences within the tidal reaches of the Douglas defend significant areas of agricultural land against both river and tidal flooding and are supplemented by a network of pumping stations (similar to that found within the Alt / Crossens CFMP) to drain the low lying agricultural land. The standard of protection ranges along the catchment, from 1 in 25 year event for Appley Bridge to 1 in 150 years event in Hesketh Bank.

3.4.0 Ribble Catchment Flood Management Plan

3.4.1 The River Ribble catchment area has a small portion of land to the north of the Borough which could be influenced by the catchment area. However, whilst the Ribble catchment has a history of flooding, with 40 significant events having been

recorded since 1600, there is no history of it having a significant impact on the West Lancashire Borough. Indeed, there is little or no flood risk from this catchment area, although the Environment Agency will continue to monitor and advise on these areas.

3.5.0 Mersey Catchment Flood Management Plan

3.5.1 The River Mersey catchment has a small portion of land to the south of the Borough contained within its area of influence.

3.5.2 Much of the catchment area is underlain by an aquifer which supports groundwater abstractions and is moderately unresponsive to rainfall events. Carboniferous coal measures underly the northern parts of the catchment and mining relates subsidence has formed open areas of water and the end of mining pumping has led to groundwater levels rising in some locations, which could affect surface runoff leading to increased flooding and a quicker responses to rainfall. The Mersey is tidally influenced downstream from Howley Weir (Warrington). The catchment has been heavily modified for industrial purposes and this has affected the natural responses of river flows.

3.5.3 Whilst the Mersey catchment area has experienced some flooding historically, there is no record of it having impacted on West Lancashire. The Borough has a low risk of flooding from this catchment area and no infrastructure or community assets are vulnerable to flooding.

3.6.0 Wyre Catchment Flood Management Plan

3.6.1 The Wyre catchment is located to the north of the Borough although no part of the Borough is directly contained within its area of influence.

3.6.2 The Environment Agency continue to monitor catchment areas and any changes to the Wyre CFMP which may affect West Lancashire will be reported in future updated reports.

3.7.0 Flood Risk Zones within West Lancashire

3.7.1 It is made clear through the Flood Zone maps provided by the Environment Agency that significant areas of land are potentially under threat from coastal and fluvial flooding. Flood Zone 3 (high risk) and Flood Zone 2 (medium risk) are identified within maps contained in the Appendix to this report. The areas shown to be at risk on these maps will be updated as better information becomes available and the Environment Agency produce amended versions of the Flood Zone maps.

3.7.2 PPS25 requires this Level 1 SFRA to consider the extent of the functional floodplain. Determining the accurate delineation of Flood Zone 3b (functional floodplain) and Flood Zone 3a (high probability) would require hydraulic modelling, which is deemed appropriate only for a Level 2 SFRA. Therefore, for the purposes of this study, it could be assumed that developed urban areas in Flood Zone 3 are identified as Flood Zone 3a, and undeveloped, Greenfield sites are identified as Flood Zone 3b. This assumption may need to be revised following any hydraulic modelling necessary as part of a Level 2 SFRA.

3.7.3 The geographical landscape of West Lancashire is of a low-lying fluvial plain which historically makes large areas of land prone to flooding. However, much of this land is used for agricultural purposes and is sparsely populated, therefore the risk to people and properties is low.

3.7.4 The highest areas of risk are to the north and west of the Borough where coastal flooding is the greatest threat. The only significant sizeable settlement within such a

high flood risk zone is Banks, which consists of approximately 1,364 properties and a population of 3,359. Sea embankments that are built to withstand a 1 in 75 year event protect the settlement of Banks and the land to the south. Other settlements in the north of the Borough including Hesketh Bank and Tarleton are not considered as in a direct flood risk area.

- 3.7.5 To the far south west of the Borough the threat of flooding from the River Alt is considered as high. Although a pumping station operates on the lower reaches of the Alt at present no other flood defence strategy exists. However, work is underway along various points for the River Alt to improve defences and a sustainable long-term strategy for flood defence within the catchment is being devised.
- 3.7.6 Other areas that have significant risks of flood are along the River Douglas, which stretches through the Borough from Hesketh Bank in the north to Appley Bridge in the south east. Along its route through the Borough the Douglas passes close to a number of settlements including Hesketh Bank, Tarleton, Rufford, Parbold and Appley Bridge. Parts of Hesketh Bank and Rufford are in direct risk of flooding from any future extreme flood event on the Douglas. Works are currently underway to improve flood defences on the upper reaches of the Douglas in Wigan and on one of the tributaries, the River Yarrow in Croston, to improve flood defence measures. However, no improvements are planned for the river's course within West Lancashire within the near future.
- 3.7.7 The main settlements of Skelmersdale, Ormskirk and Burscough do not directly lie in areas of significant flood risk although properties located adjacent to the River Tawd in Skelmersdale and Sandy Brook in Ormskirk may be at some localised risk and may affect areas of development pressures in the towns.

3.8.0 Flood Risk Management Systems within West Lancashire

- 3.8.1 Through the National Flood and Coastal Defence Database (NFCDD), which is compiled by the Environment Agency, the local authority area is sub-divided into smaller catchment systems, which are considered to be at greater or lesser risk of flooding. The paragraphs below identify the various systems within West Lancashire; a map to show this information is attached in the Appendix.
- 3.8.2 Banks Marsh System: This is a medium risk system with a total of 37 properties identified as being at risk by the Environment Agency. The system is an area of land characterised as low lying that is enclosed by a raised sea embankment. In relation to the flood defences in this area the standard is for a 1 in 50 year event, routing and recurring maintenance is carried out with medium to low inspection frequencies.
- 3.8.3 Hesketh Bank System: This is a high flood risk system with a total of 78 properties identified as being at risk by the Environment Agency. The majority of this area is situated within the Hesketh inner marsh, which was previously salt marsh land that has subsequently been reclaimed for agricultural purposes, with an embankment constructed to keep out the sea. In relation to the flood defences in this area the standard is for a 1 in 75 year event. Routine and recurring maintenance is carried out with medium to low inspection frequencies.
- 3.8.4 Martin Mere System: This is a high flood risk system with a total of 2250 properties identified by the Environment Agency as being at risk. This system includes the majority of the watercourse within the Crossens catchment, draining all of the low lying wetland area and also includes a number of satellite pumping stations. In relation to the flood defences the standard in this system is for a 1 in 40 year event. In this area, routine and recurring maintenance is carried out with medium to low inspection frequencies.
- 3.8.5 Croston and Mawdsley System: This is a high flood risk system with a total of 652 properties identified by the Environment Agency as being at risk. This system covers

a wide geographical area and only a small proportion is situated within West Lancashire itself. This system contains most of the low level flood plain for the River Douglas. In relation to the flood defences the standard in this system is for a 1 in 50 year event. In this area routine and recurring maintenance is carried out.

- 3.8.6 Skelmersdale System: This is a high flood risk system with a total of 198 properties identified by the Environment Agency as being at risk. The system includes one of the mid-reaches of the River Douglas along with the River Tawd and its tributaries. In relation to flood defences the standard within this system is for a 1 in 60 year event. Routine and recurring maintenance is undertaken within the system and monthly vermin and grid inspections carried out.
- 3.8.7 Eller System: This is a low risk flood system with a total of 5 properties identified by the Environment Agency as being at risk. The system consists of Eller Brook and its tributaries, with the character of the system predominately rural. Eller Brook itself is embanked for most of its reach. In relation to the flood defences, the standard within this system is for a 1 in 40 year event. In this area routine and recurring maintenance is carried out.
- 3.8.8 Ormskirk System: This is a high flood risk system with a total of 242 properties identified by the Environment Agency as being at risk. The system consists of the upper reaches of Sandy Brook and Eller Brook. In relation to the flood defences the standard within this system is for a 1 in 30 year event. Yearly maintenance takes place on the whole Sandy Brook reach and recurring maintenance is undertaken through the whole urban area.
- 3.8.9 Aughton System: This is a medium flood risk system with a total of 20 properties identified by the Environment Agency as being at risk. The system consists of the lowest reaches of the Sudell Brook with two tributaries that drain the villages of Aughton and Town Green. In relation to the flood defences the standard within this system is for a 1 in 70 year event. Routine and recurring maintenance is carried out within the system, hence a low inspection frequency. A grid between Town Green Brook and St Michaels Park gets frequent inspections in periods of wet weather.
- 3.8.10 Bickerstaffe System: This is a low flood risk system with a total of 11 properties identified by the Environment Agency as being at risk. The system consists of the middle and upper reaches of the Sudell Brook including its tributaries just below the M58. In relation to the flood defences routine and recurring maintenance is carried out within the system, hence a low inspection frequency. The inspection frequency in this system is also linked to the low risk to properties.
- 3.8.11 Altcar and Ince System: This is a low flood risk system with a total of 40 properties identified by the Environment Agency as being at risk. The system consists of the low lying (flood plain) of the Alt Catchment and is only in part situated within West Lancashire. It also includes 3 satellite pumping stations. Although considered a low flood risk system this does assume that the existing sea defences remain intact. Should such features fail, the area would be at risk of inundation.

3.9.0 Defended Areas within West Lancashire

- 3.9.1 There are a number of flood defences found within the local authority area that protect West Lancashire from both fluvial and coastal flooding, such structures are constructed and maintained by the Environment Agency.
- 3.9.2 As stated earlier, a significant proportion of West Lancashire is low lying and protected by coastal defences, located to the north of the settlement of Banks. The sea embankment here provides protection not only for the Banks itself but also for the agricultural land to the south, located within the Martin Mere flood management system. The embankment at this location is built to withstand a 1 in 75 year event. Also located in this area are a number of pumping stations that assist in the removal

of water from the area. However, the land around Banks and to the south is still considered as high flood risk due to its reliance on flood defences.

- 3.9.3 Further flood defences are found at Downholland Brook, located in the south west of the Borough. This assists in protecting land from fluvial flooding via the Brook and consists of a pumping station and lengths of levees. The defences here protect the small settlement of Great Altcar and the agricultural land surrounding the River Alt. Again, although protected by such flood defences this land remains at high flood risk.
- 3.9.4 Significant proportions of the watercourses within West Lancashire have raised embankments to protect from both fluvial and tidal flooding, such embankments are constructed to protect for a 1 in 50 year event.
- 3.9.5 The Borough also contains a network of pumping stations that assist in the movement of water away from low lying areas in the north and west of the Borough. Significant proportions of land, mainly agricultural, rely on such stations to keep them free from standing water, particularly in times of heavy rain. The table below highlights the locations of such pumping stations within the Borough.

Types of Defence Present	Watercourse
Satellite Pumping Stations	<ul style="list-style-type: none"> • Holmeswood Pumping Station • Mere Sands Wood Drain / Sluice • Kew Syphon • Altcar pumping stations • Rufford / Causeway • Banks Marsh • Fine Janes Pumping Station • New Cut Pumping Station(s) • Boundary Pumping Station • Clay Brown Pumping Station(s)
Pumping stations with tidal gate	<ul style="list-style-type: none"> • Crossens Pumping Station, The Sluice, Back Drain, Three Pools Waterway • Banks Marsh Pumping Station, Banks Marsh Pumping Station Outfall

Table 1 – Flood defences in West Lancashire

- 3.9.6 A number of schemes are underway to improve current flood defences, which will have a direct or indirect impact on West Lancashire. Such improvements may include structural works or flood defence strategies.
- 3.9.7 On the River Alt catchment, of which only a small proportion is located within West Lancashire, a strategy is to be prepared assessing the potential for significant flooding within the catchment area as the reliability of the pumping station (established 36 years previously) begins to diminish in reliability. It is proposed that a sustainable long-term strategy for flood defence within the catchment is required, which could include the potential for the creation of wetland habitats and controlled spill areas.
- 3.9.8 Improvements have been completed to the floodwall at Croston (within Chorley Borough Council) on the River Yarrow, which is a tributary of the River Douglas as that confluence north of Rufford. Existing flood defences including retaining walls, are in need of replacing to prevent future failure, which would result in widespread flooding.

- 3.9.9 Improvement works on the River Douglas in Wigan also may have an indirect impact on flooding issues within West Lancashire. The improvement schemes will have to be considered as part of the feasibility study. However, the urban environment that surrounds the river in this area will limit potential solutions.

3.10.0 Recorded Flooding Events in West Lancashire

- 3.10.1 A number of flooding events have taken place within West Lancashire, either by fluvial, tidal or non-fluvial flooding sources. Such events are highlighted below:
- 3.10.2 In the past flooding along the Eller Brook was commonplace due to the failure of flood defence structures. However, such structures were improved during the 1970s and since there have been no reported flooding events. More recently, concerns have been expressed about flooding on the upper reaches of the Eller Brook adjacent to the Pines Estate, Ormskirk. Significant flooding has occurred here in July and October 1994. West Lancashire Borough Council have recognised issues with respect to both inadequate surface water drainage and limited culvert capacity in and around this area.
- 3.10.3 Flooding events are also recorded at Calico Brook, Appley Bridge, which is mainly the result of limited capacity within the culvert that carries the brook underneath the Millbank Housing Estate; this is exacerbated by the hydraulic inefficiency of other structures on Calico Brook. Within weeks of completion of the estate in 1987, severe flooding to the depth of 2.5 metres was experienced. In July 1990, Bullen and Partners were commissioned to investigate options to alleviate future flooding of the Millbank Estate. The initial phase of their scheme involving diverting Calico Brook into the adjacent East Quarry, which started in 1989 as an emergency measure. Further stages of the project propose modifications to the culverts as a longer-term solution; these are yet to be implemented.

3.11.0 Non-fluvial flooding events within West Lancashire

- 3.11.1 Following discussions with drainage engineers within West Lancashire Borough Council a number of flooding events were identified that are not sourced from either tidal or fluvial actions. Such non-fluvial events may be the result of under capacity in the drainage system, the blockages of existing culverts or through the surcharging of mains sewers. Such events and locations are identified within Appendix 6 of this report.
- 3.11.2 The Council have tried to identify all sources of flooding – including land, groundwater and artificial sources (canals/reservoirs) as outlined in Annex C of PPS25 – and include them in this Level 1 SFRA. Information is provided, where known. However, the listing found in the Appendix to this document is not considered to be a finite list of non-fluvial flooding problems within the Borough. Not all flooding events are reported to the Council and flooding often occurs on agricultural land, which can go unnoticed. The list is subject to change with existing flooding problems being solved through the implementation of works to the drainage systems and new flooding events being recorded. As a result, the listing in the appendix is not believed to be comprehensive and will need to be reviewed on a regular basis.
- 3.12.3 Appendix 9 provides an overview of properties on the DG5 register, with data supplied by United Utilities. It should be used as a guide to those areas most affected rather than being used to pinpoint specific, affected properties.

3.12.0 Surface Water Flooding

- 3.12.1 Surface water flooding occurs where high rainfall events exceed the drainage capacity in an area. Such events can lead to serious flooding of property and possessions. Climate change is likely to increase the risk of surface water flooding

due to higher intensities and prolonged periods of rainfall. Subsequently, local authorities such as West Lancashire need to ensure that sufficient management plans and drainage systems and technologies are utilised and implemented.

- 3.12.2 The Environment Agency has identified those areas that are the most and least susceptible to surface water flooding. Appendix 11 shows the risks for the main settlements in the Borough. Each of the main settlements contains pockets of land that is highly susceptible to flooding.

4.0 Development Pressures

4.1 As previously indicated the majority of land that is susceptible to flood within West Lancashire is located within the Green Belt and is used for agricultural purposes. The main settlement areas of Ormskirk, Burscough and particularly Skelmersdale have been defined within the Replacement Local Plan as the focus for future development. All three settlements are not located in the main flood risk areas and only suffer from localised flood risk issues.

4.2 Skelmersdale

4.2.1 The town of Skelmersdale is the main focus for development in the Borough due to its RSS designation as a Main Town, and is located in the far south-eastern portion of the Borough. Due to the settlement being situated on higher ground, away from the coast, the flood risks within the town, particularly from tidal sources, are virtually nil.

4.2.2 All the Options proposed through the Core Strategy have the majority of housing, employment and retail development concentrated in Skelmersdale, although proportions differ with each Option. Subsequently, it is likely that some form of expansion to the settlement area will be required and changes to the Green Belt boundary would be needed. It would therefore be essential that there were no implications of an increased flooding risk to either existing or proposed new developments.

4.2.3 The only fluvial risk for the town is the potential for flooding along the River Tawd, which runs through the town. Much of the watercourse length is within the Tawd Valley park. The risk for flooding along this watercourse has been identified within the flood zone maps for the Borough produced by the Environment Agency. Any development proposed within or adjacent to such high risk areas would have to consider the direct and indirect impacts of development on this watercourse.

4.2.4 In terms of non-fluvial risks the recorded flooding events within Skelmersdale are low. This can be attributed to Skelmersdale's status as a new town with much of the infrastructure, including drains and culverts, being modern in design and capacity.

4.3.0 Ormskirk

4.3.1 Ormskirk is the historic centre of West Lancashire and is considered the administrative centre of the Borough. Again, the settlement is situated on relatively high ground to the south of the Borough and accordingly flood risks from tidal and fluvial sources are extremely low.

4.3.2 The options proposed through the Core Strategy (Options Paper, Sept 2009) have varying levels of development focused in Ormskirk, after the majority of development has been allocated to Skelmersdale:

- Option 1: Ormskirk would have its growth restricted to the use of windfall and infill sites within the towns boundary.
- Option 2: Ormskirk would have a greater focus of development, with infill development and some Green Belt release likely. Any changes to the Green Belt boundary would need to be considered only in the most sustainable locations and ensuring a low-risk of flooding.
- Option 3: Ormskirk would still have development focused within the town but there would be a greater proportion enabled in Burscough.
- Options 4 and 5 would see development in Ormskirk restricted to its urban areas with no Greenfield development permitted.

- 4.3.3 Greater development in Ormskirk could put pressure on existing infrastructure, potentially perpetuating problems, whilst less development in Ormskirk could mean that any required infrastructure works, including utilities, cannot be fully influenced by the Core Strategy.
- 4.3.4 The only fluvial risks to the town, identified by the Environment Agency, are that of Sandy Brook, which runs into the town from the north. As with the River Tawd, this poses localised flooding issues to the properties that are adjacent to the Brook. Flood problems have also been identified on the upper reaches of the Eller Brook where multiple localised flooding incidents have occurred to residential properties. A map is provided in Appendix 8 showing the risk of flooding from Sandy/Hurlston Brook, which may affect areas of development pressures in Ormskirk. As with all the maps, they should be taken as general guidance only.
- 4.3.5 In terms of non-fluvial flooding risks in Ormskirk, the number of recorded flood events are significantly higher than those found within Skelmersdale. This can be attributed to the historic nature of the town with a great deal of the drainage infrastructure dating back many years. Accordingly, any major development proposed within the town will need to consider its impact on these non-fluvial flood risks and whether mitigation or improvement works will be required as part of the development.

4.4.0 Burscough

- 4.4.1 Burscough is located in the centre of the Borough and is not considered to be within a flood risk zone, as identified by the Environment Agency. Burscough is the lowest lying of all three main settlements within West Lancashire and accordingly is in close proximity to the boundary of high flood risk areas to the north and west of the Borough. Therefore, it should be noted that although flooding from fluvial and tidal sources is considered to be low, the risks are greater in this location than that of both Skelmersdale and Ormskirk.
- 4.4.2 Like Ormskirk, Burscough would have varying levels of development dependent on the Option:
- Option 1: Burscough would have its growth restricted to the use of windfall and infill sites within its boundary.
 - Option 2: Burscough would still have limited development with infill development enabled.
 - Option 3: Burscough would have significant levels of development focused within the town, including infill sites, regeneration of brownfield sites and expansion into the Green Belt. Any changes to the Green Belt boundary would need to be considered only in the most sustainable locations and ensuring a low-risk of flooding.
 - Options 4 and 5 would see development in Burscough restricted to its urban areas with no Greenfield development permitted.
- 4.4.3 No development can currently be supported in Burscough due to the constraints on infrastructure and the increased risk of non-fluvial flooding. The Preferred Option will need to indicate how these issues will be resolved.
- 4.4.4 Although flood risk zones do not affect the settlement directly there are fluvial flood risks associated with Eller Brook, which runs to the east of Burscough. Again, it is considered that such a flood risk is localised and would only affect land that is directly adjacent to the Brook itself. As stated, development proposed would have to consider direct and indirect impacts of flooding in relation to Eller Brook.

4.4.5 Burscough is a historic market town and has seen significant growth over recent decades. This has resulted in a high number of recorded flood events that are attributed to non-fluvial flooding sources. A great number of flooding events are attributed to the under-capacity of the drainage infrastructure. It is proposed that significant levels of regeneration will take place in the near future. Accordingly, any major development within Burscough will need to consider its impact on these non-fluvial flood risks and whether mitigation or improvement works will be required as part of the development.

4.5 Parbold

4.5.1 Parbold is situated in the east of the Borough and not within any high flood risk areas. The settlement area is located directly adjacent to the River Douglas, which does have associated risks from fluvial flooding. Raised embankments are in place on this length of the Douglas that will protect properties adjacent to the river from a 1 in 40 year flooding events.

4.5.2 Development in the rural areas of the Borough is restricted under Options 1, 2, 3 and 5, other than for localised need. Under Option 4, Parbold would see development for local needs and would be located predominately on windfall sites or through the regeneration of existing sites. It will be important to ensure that additional pressures on infrastructure do not exacerbate the risk of non-fluvial flooding and that development is not located in areas of fluvial flood risk.

4.5.3 There are a number of non-fluvial flooding events recorded in Parbold. These mainly relate to under-capacity issues and possible blockages in local culverts. Accordingly, any major development within Parbold will need to consider its impact on these non-fluvial flood risks and whether mitigation or improvement works will be required as part of the development.

4.6 Appley Bridge

4.6.1 Appley Bridge is situated in the east of the Borough and with portions of the settlement identified within high flood risk zone 3. As with Parbold, part of the settlement area is located directly adjacent to the River Douglas which does have associated risks from fluvial flooding.

4.6.2 As with Parbold, under Option 4, development in Appley Bridge would be for local needs and would be located predominately on windfall sites or through the regeneration of existing sites. It will be important to ensure that additional pressures on infrastructure do not exacerbate the risk of non-fluvial flooding.

4.6.3 There are a number of recorded events relating to Calico Brook and East Quarry. It is recommended that any future development, particularly any redevelopment within East Quarry consider flooding issues in the vicinity and consider mitigation and improvement works to reduce flood risk.

4.7 Tarleton and Hesketh Bank

4.7.1 Neither settlement lies directly within a flood zone area. However, land to the north of Hesketh Bank does lie within an area of high flood risk from tidal sources and land to the east of both Tarleton and Hesketh Bank lies in an area of high-risk fluvial flooding from the River Douglas.

4.7.2 Sustainable development and expansion of these settlements through the Preferred Option could involve moderate development but this would look to re-use derelict sites located on the urban fringe. Any major developments within these areas will have to be considered in relation to such high-risk areas.

- 4.7.3 Similarly to Burscough, both Tarleton and Hesketh Bank have seen significant growth over recent years. As a result, a number of flooding events have been recorded that are non-fluvial in source, mainly due to sewerage under capacity in the area. Accordingly, any major development within Tarleton and Hesketh Bank will need to consider its impact on these non-fluvial flood risks and whether mitigation or improvement works will be required as part of the development.

4.8 Banks

- 4.8.1 Banks is the only settlement of a significant size to be situated within a defined high-risk flood area. Banks itself is protected by a sea embankment to the north and is reliant on this defence for protection from tidal flooding. Any proposals for development within or surrounding the Banks area must be considered in terms of the risks posed from flooding. Development in this area must satisfy the Sequential Test in PPS25 and flood risk must be managed through appropriate mitigation measures.
- 4.8.2 Due to the constraints created by the flood risk, it is likely that development and expansion in Banks will be limited to local needs and will be heavily influenced by the risk of flooding that exists.

4.9 Rufford

- 4.9.1 Potential flooding in Rufford derives from the River Douglas and the Leeds and Liverpool Canal. Whilst some dwellings could be affected by flooding, the majority of land within the flood zones relates to open countryside or agricultural land as well as the marina. Infrastructure could be affected by flooding of the rail line. Climate change may extend the boundaries of the flood zones and increase the risk of flooding in the area, with the potential to impact upon Rufford Old Hall, a listed building owned by the National Trust. The risk of flooding is listed by the Environment Agency as significant, which means it has risk greater than 1.3% of flooding each year.
- 4.9.2 Development under the Options would be unlikely to locate significant development in Rufford and most likely would be for small housing schemes or employment uses. The risk of flooding could be mitigated for through the correct location of development and the Development Control process. It will be important to ensure that additional pressures on infrastructure do not exacerbate the risk of non-fluvial flooding.

4.10 Other settlements in West Lancashire

- 4.10.1 The remainder of the Borough is either made up of open countryside in agricultural uses or small settlement areas surrounded by Green Belt. The Borough Council do not consider these areas to be the focus of significant development pressures and any major developments proposed in these areas should be judged on a case by case basis to their impact on flooding.

5.0 Flood Risk Sensitivities

- 5.1 PPS25 specifies that Planning Authorities should consider the future effects of climate change and urban development upon the flooding risk.

Flood Sensitivity to Climate Change

- 5.2 As a result of climate change, it is widely expected that there will be more frequent short duration, high intensity rainfall and more frequent periods of long duration rainfall. It is also expected that sea levels will continue to rise, which will have implications for coastal, tidal and river flooding and for local flash flooding. According to PPS25 (Table B.2, Annex B, Dec 2006), the North West of England should expect to see a net sea level rise of 7.0mm/yr between 2025 to 2055. Climate change could affect the rate of erosion and deposition along the coastline.
- 5.3 Within urban areas, the frequency and severity of flooding from these high intensity events is expected to increase due to limitations of existing surface water drainage systems. However, without the availability of detailed models and flood outlines for surface water flooding it is difficult to provide a detailed assessment of this.
- 5.4 The Environment Agency suggest that a pragmatic approach is taken for the purposes of the Level 1 SFRA and that the current outline of Flood Zone 2 should be seen as indicative of the potential extent of Flood Zone 3 once climate change is taken into account. In turn, those areas within Flood Zone 1 that are adjacent to Flood Zone 2 may become part of Flood Zone 2, once the effects of climate change are realised.
- 5.5 Given that the extent of Flood Zone 3 would be expected to gradually extend to match the current area of Flood Zone 2, any risk to development within Flood Zone 2 is likely to increase over time with climate change. Those areas directly adjacent to Flood Zone 2 and currently within Flood Zone 1 may be subject to an increased flood risk in the future and development in such locations may need to include provision for flood proofing or protection to take account of such change. The effects of climate change will be considered in more detail where the need for a Level 2 SFRA is identified, and this may need to include those sites within Flood Zone 1 but adjacent to Flood Zone 2.
- 5.6 With regard to fluvial flood risk, guidance from DEFRA on assessing climate change sensitivity recommends assuming a 10% increase in fluvial flow up to 2025 and then an increase of 20% thereafter. However, again, without detailed modelling, the potential future effects on the Borough are difficult to assess precisely.
- 5.7 If flood zones extend as a result of climate change, certain parts of the Borough will be unsuitable for development, and this could include some of the proposed development locations. This will be of particular importance in Banks and Skelmersdale (given the proposals for the new town centre).

Flood Sensitivity to increased urban development

- 5.8 Opportunities exist to plan future urban development whilst giving consideration to the management of flood risk within West Lancashire. Appreciating the risk and reducing this risk by locating new developments appropriately or by making proposed developments resilient to flooding forms part of this strategic, managed approach. This can be achieved through careful planning and development control. Sensitive location and design of development sites and buildings as well as mitigation measures can all contribute to reducing the risk of flooding.

- 5.9 New developments tend to increase the impermeability of sites through the construction of buildings and ground surfaces. This can result in surface water run-off that, in turn, can cause flooding elsewhere. Surface water run-off from new developments will generally need to be controlled to prevent an increased flood risk, often by way of developers undertaking a Drainage Impact Assessment. This is equally important for greenfield and brownfield developments. In many areas it will be appropriate to implement some form of Sustainable Drainage System (SuDS).
- 5.10 The Regional Spatial Strategy for the North West (NW RSS) indicates that between 2003 and 2021 there should be a total of 6000 homes provided in the Borough and that 93 Hectares of additional employment land need to be allocated to support development and growth. A significant proportion of these new housing and economic developments will be directed to 'brownfield' sites. Section 2.47 of the PSS25 Practice guide states that *"both the rates and volumes of run-off from new developments should be no greater than the rates prior to the proposed development, unless specific off-site arrangements are made which result in the same net effect"*.
- 5.11 Consideration needs to be given to development that could be affected by fluvial or non-fluvial flooding. In particular, significant problems may be encountered with fluvial flooding in Banks and the northern parishes and non-fluvial flooding in Burscough due to insufficient infrastructure being able to support surface run-off. Any further development in Burscough or Ormskirk should be supported by sufficient infrastructure improvements to cope with the demand. The maps in the Appendices illustrate those areas most affected by the risk of flooding. In these locations development should be sensitively located and designed to reduce and mitigate against the risks of flooding. PSS25 forms the framework for this process.

6.0 The Next Steps

The Next Steps of Strategic Flood Risk Assessment

- 6.1 As stated in Section Two of this report, the initial assessment only represents a first stage in the SFRA process. It is expected that any development that is proposed within or adjacent to areas of high risk will require further detailed assessment works, including modelling works to more accurately define the risk of flooding and the impact a proposed development will have. This work will be done to a standard deemed acceptable to the Environment Agency. A similar course of action will be necessary from the Borough Council if proposals to allocate specific land in an area of flood risk for development are brought forward through the Local Development Framework.
- 6.2 All development proposals must be screened to determine whether or not the site would be at risk of flooding or whether or not the development of the site would exacerbate flood risk elsewhere.
- 6.3 Where development is proposed within the vicinity of a known non-fluvial flood risk then the direct and indirect impact of development on the potential flood risk must be considered. If, after a thorough assessment, the conclusion is that the potential risk is increased, then satisfactory mitigation or improvement works should be agreed. If this is not possible, then the site should not be allocated for development and planning permission should be refused.