



Wyre Level 2 Strategic Flood Risk Assessment

Wyre Borough Council

Level 2 SFRA Report

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Executive Summary

Wyre Borough Council (the Council) are currently in the process of preparing their Local Plan, which will set out policies for development of land in the borough for the next 15 years (to 2031), including the allocation of sites. When adopted, the Plan will form the statutory Development Plan for Wyre.

Under the National Planning Policy Framework (NPPF), flood risk must be considered at all stages of the development planning process. This should ensure that a risk-based, sequential approach to the allocation of development has been implemented and, where development is required in areas of risk, that the development and its users will be safe for the lifetime of that development.

Strategic Flood Risk Assessments (SFRAs) inform this process, by highlighting areas that may flood, taking into account all known sources of flooding and the likely impacts of climate change. SFRAs also take into account the latest policy, legislation and guidance, to ensure the Council and developers can make informed decisions on the location and form of new development in a sustainable way at the earliest possible stage of the process. SFRAs will help ensure future planning decisions do not inadvertently increase the potential risk of localised flooding and, where possible, seek to improve flood management.

The Council prepared a Level 1 SFRA in July 2015 with the aim of providing a high-level understanding of the geographical distribution of flood risk across the borough. The SFRA highlighted that flood risk is a significant planning consideration for the borough. This was particularly evident within the coastal peninsula and within rural towns and villages situated along major river networks, where defended fluvial and tidal flood zones cover large areas of existing urban development.

Following this, the Council undertook a substantial amount of work in house, reviewing potential development sites against a range of flood risk information and local knowledge collected in the Level 1 SFRA. The Council documented their review in a set of 'Site Proformas' setting out each sites flood risk and vulnerability classification, Sequential and Exception Test requirements, potential discharge options and drainage calculations, and suitable flood mitigation measures.

To supplement the work already undertaken by the Council, this Level 2 SFRA focuses on providing further detailed information of flood hazard, taking account of the presence of flood management assets such as flood defences. In order to present this information at the right level, the Level 2 SFRA has split the borough into four distinct Community Areas, encompassing broadly homogenous characteristics and development requirements in terms of flood risk. Flood Mapping has also been provided representing a GIS data collected. The four Community Areas are:

- 1) Coastal Peninsula including Cleveleys Fleetwood and Thornton and Poulton-Le-Fylde;
- 2) Pilling, including Knott End-on-Sea and Hambleton;
- 3) Great Eccelston, Inskip and St. Michael's on Wyre; and
- 4) M6 Corridor, including Garstang and Catterall.

Together, the SFRA documents and Flood Maps will ensure that all intended users (Spatial Planners, Development Management Officers and Developers) have enough information to apply to risk based sequential approach to development at all levels of the planning process.

All documents and mapping will complement each other and ensure any conclusions on the suitability of each site for development and necessary mitigation are robust given the supporting evidence. They will also provide the Council with sufficient evidence to apply the Sequential Test in line with the NPPF and to establish whether the requirements of the Exception Test can be met, when allocating sites in medium to high flood risk areas.

1. Introduction

1.1 Commission

Wyre Borough Council (the Council) commissioned Jacobs UK in January 2016 to undertake a Level 2 Strategic Flood Risk Assessment (SFRA) leading on from the Level 1 SFRA prepared by the Council in July 2015. This Level 2 SFRA has been prepared in accordance with the National Planning Policy Framework (NPPF).

This Level 2 SFRA has been prepared in consultation with the Environment Agency (EA), United Utilities (UU) and Lancashire County Council (LCC).

1.2 Project Overview

The Borough of Wyre is a coastal authority in the North West of Lancashire. It shares a common land boundary with the City of Lancaster to the north, with the Boroughs of Ribble Valley, Preston and Fylde to the east and south respectively and with Blackpool Unitary Authority along the remainder of its western boundary. The borough has a population of approximately 108,000 and covers an area in excess of 28,000 hectares, which is characterised by a distinct geographical polarity, with the urban concentration situated in the west of the borough, and a large expanse of rural area to the east.

The Council's Local Plan will set out policies for development of land in the borough for the next 15 years (to 2031), including the allocation of sites. When adopted, the Plan will form the statutory Development Plan for Wyre, replacing the former 1999 Local Plan and the Fleetwood-Thornton Area Action Plan.

SFRAs act as a key part of the evidence base for the allocation of land in the Local Plan, by highlighting areas in the borough that may flood, taking into account known sources of flooding and the likely impacts of climate change. SFRAs take into account the latest policy, legislation and guidance, to ensure the Council can make informed decisions on the location and form of new development in a sustainable way at the earliest possible stage of the development planning process. SFRAs help ensure future planning decisions do not inadvertently increase the potential risk of localised flooding and, where possible, seek to improve flood management.

SFRAs therefore have a direct bearing on the consideration of suitable sites for development and their findings will enable the Council to demonstrate that the risk-based, sequential approach to the allocation of development has been implemented in accordance with the NPPF as part of the Sustainability Appraisal process NPPF.

1.2.1 Level 1 SFRA

The Council prepared a Level 1 SFRA in July 2015 with the aim of providing a high-level understanding of the geographical distribution of flood risk across the borough. Although the Level 1 SFRA considers the risk of flooding from all sources, the Flood Map for Planning prepared by the Environment Agency provides the principal input for the study.

The SFRA highlighted that flood risk is a significant planning consideration for the borough. This was particularly evident within the coastal peninsula and within rural towns and villages situated along major river networks, where defended fluvial and tidal flood zones cover large areas of existing urban development. In terms of flood risk, the Level 1 SFRA split the borough into five distinct areas as identified in Figures 2-1 and Table 2-2 of the Level 1 SFRA, including:

- 1) Upper Wyre;
- 2) Central Wyre Area;
- 3) Core Area, Upper Estuary;
- 4) Core Area, Lower Estuary; and
- 5) Over Wyre, Lower Estuary.

The Level 1 SFRA however highlighted the important role existing flood defence assets play in managing risk across the distinct areas. As the Council's strategic areas for development lay inside areas currently benefitting from defences, the information used to inform the Level 1 SFRA was not detailed enough to justify any decision made to avoid, substitute or allocate future development land (through the application of the Sequential and Exception Tests).

1.2.2 Level 2 SFRA

The Council has undertaken a substantial amount of the background work for the Level 2 SFRA in house including a review of each potential development site in terms of their flood risk and vulnerability classification, Sequential and Exception Test requirements, potential discharge options and drainage calculations, and suitable flood mitigation measures. The Council have documented their review in 'Site Proformas', which will be made available along with the SFRA reports.

The scope of this Level 2 SFRA has therefore been tailored to supplement the work already undertaken by the Council by providing a more detailed understanding of flood hazard, taking account of the presence of flood risk management measures such as flood defences. The Level 2 SFRA should provide further evidence and guidance to support the Level 1 SFRA and Site Proformas.

Together, all documents and mapping will complement each other and ensure any conclusions on the suitability of each site for development and necessary mitigation are robust given the supporting evidence. They will also provide the Council with sufficient evidence to apply the Sequential Test in line with the NPPF and to establish whether the requirements of the Exception Test can be met, when allocating sites in medium to high flood risk areas. The Level 2 SFRA will contain:

- An appraisal of the current condition of formal and informal flood defence infrastructure, and the likely future management policy with regard to its maintenance and upgrade;
- An appraisal of the probability and consequences of overtopping or failure of flood risk management infrastructure, including an appropriate allowance for climate change;
- Definition and mapping of the functional floodplain in locations where this is required;
- Maps showing the distribution of flood risk across all flood zones from all sources of flooding taking climate change into account;
- Guidance on appropriate policies for sites which satisfy both parts of the Exception Test;
- Guidance on the preparation of FRAs for sites of varying risk across the flood zones, including mitigation and information about the use of SUDS techniques;
- Identification of the location of critical drainage areas and identification of the need for Surface Water Management Plans; and
- Meaningful recommendations to inform policy, development control and technical issues.

1.2.3 Community Areas

As the Council has already undertaken a site level assessment of each potential development site, this Level 2 SFRA has presented its findings at a community level. Each Community Area reflects a variation in character across the borough from the densely developed coastal peninsula to the rural M6 corridor, which includes the market town of Garstang.

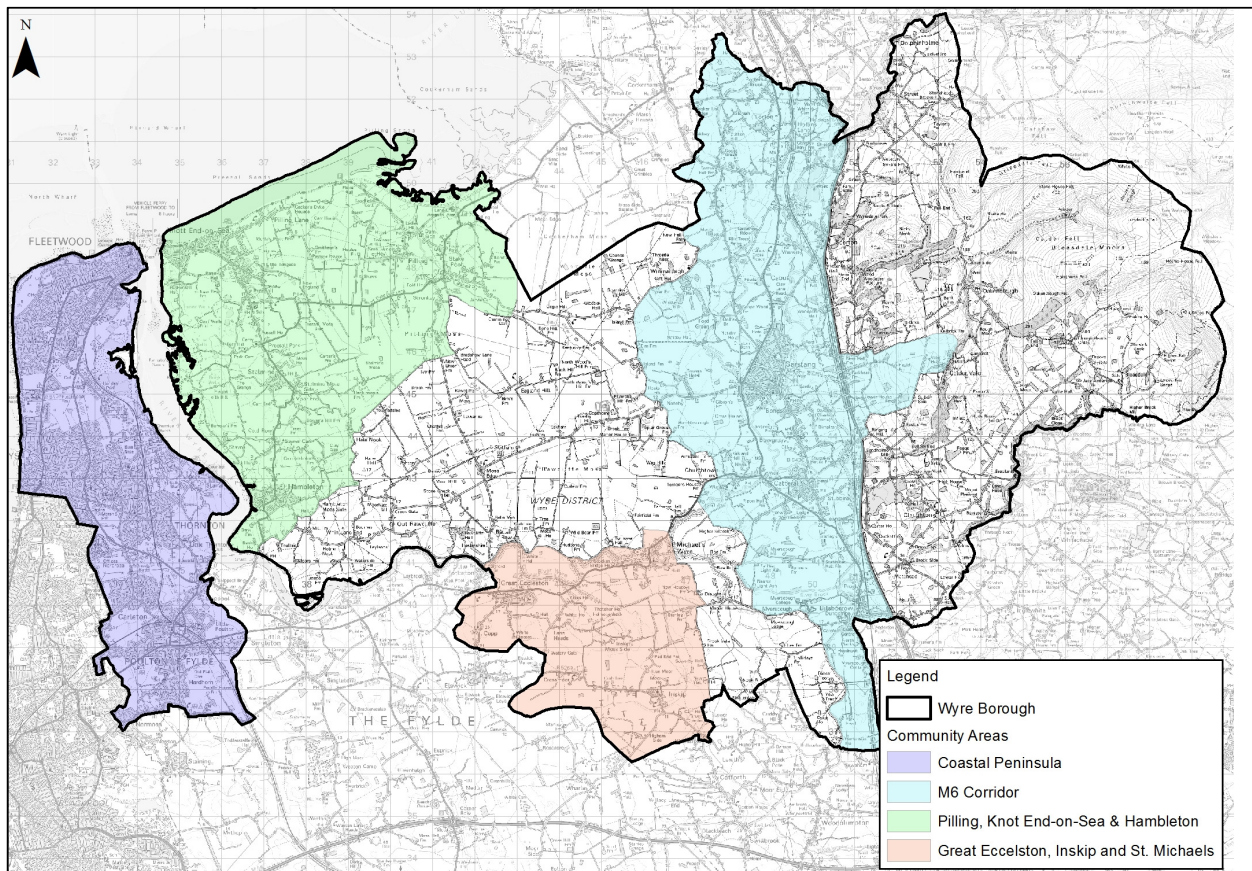
Figure 1.1 illustrates the four distinct Community Areas, which include:

- 1) Coastal Peninsula including Cleveleys Fleetwood and Thornton and Poulton-le-Fylde;
- 2) Pilling, including Knott End-on-Sea, Hambleton, Preesall and Stalmine;
- 3) Great Eccelston, Inskip and St. Michael's; and
- 4) M6 Corridor, including Garstang and Catterall.

The risk of flooding within each Community Area will differ depending on the sources present, how they interact, flood defence infrastructure present and the nature of the surround developments. The Community Area assessments, presented in Section 3, will include the following information:

- Detailed consideration of flood risk from all sources;
- An appraisal of the current condition of flood defence infrastructure, and the future management policy for its maintenance and standard of protection;
- An appraisal of the consequences of flood defence overtopping or failure;
- Delineation of Flood Zone 3b, the functional floodplain;
- Guidance on appropriate policies for sites which satisfy both parts of the Exception Test;
- Identification of the location of Critical Drainage Areas (CDA) and identification of the need for Surface Water Management Plans; and
- In addition, guidance is provided for the preparation of Flood Risk Assessments (FRA) for sites of varying risk across the flood zones, including mitigation and information about the use of Sustainable Drainage (SuDS) techniques and recommendations to inform policy, development control and technical issues.

Figure 1-1: Level 2 SFRA Location Plan



2. Methodology

2.1 Introduction

The Level 1 SFRA provides an overview of the different sources of flooding across the borough. This section of the Level 2 SFRA summaries the approach taken to develop this Level 2 SFRA and the detailed input data used to produce the Level 2 SFRA Flood Maps. Section 3 of this report contains the results of the Community Areas assessment. Section 3 should be read in conjunction with the Council's Site Proformas.

2.2 Assessment Methodology

2.2.1 Coastal Flood Risk

The Flood Map for Planning (FMfP)¹ indicates the extent of land at risk of flooding from the sea from a 0.5% Annual Exceedance Probability (AEP) (1 in 200-year) and the 0.1% AEP (1 in 1,000-year) tidal event, presenting Flood Zone 3 and 2 respectively. The FMfP does not take the impact of flood defences into account.

The majority of the borough coast is protected by a series of flood defences and in addition, the FMfP identifies the location of existing flood defences and the land that they protect (Areas Benefitting from Defences, ABDs).

To develop the understanding of the geographical distribution of current and residual flood risk across the tidal flood zones, hydraulic modelling outputs of undefended and defended scenarios were requested from the Environment Agency. The Environment Agency supplied the Lancashire Tidal Areas Benefitting from Defences Revisited Study (2015)² and the Lancashire Tidal Flood Risk Mapping Study (2015)³ containing tidal flood depths, velocity and hazards along the coast and River Wyre estuary for a range of undefended and defended flood event scenarios.

2.2.2 Fluvial Flood Risk

The FMfP indicates the extent of land at risk of flooding from a 1% AEP (1 in 100-year) and the 0.1% AEP (1 in 1,000-year) fluvial event, delineating Flood Zone 3 and 2 respectively. The FMfP does not take into account the impact of flood defences.

The majority of the River Wyre and its major tributaries are however protected by a series of flood defences and in addition, the FMfP identifies the location of existing flood defences and the land that they protect. There are known raised flood defences identified on the River Wyre north of Garstang and to the west of Catterall. In addition, The Environment Agency constructed two flood storage areas (FSA) at Garstang and St. Michael's/ Catterall in the early 1980's, as part of a Flood Alleviation Scheme (FAS).

To develop the understanding of the geographical distribution of actual and residual flood risk across the fluvial flood zones, hydraulic modelling outputs of undefended and defended scenarios were requested from the Environment Agency. The Environment Agency supplied the River Wyre Strategic Flood Risk Mapping Study (2014)⁴ containing fluvial flood depths, velocity and hazards along the coast and River Wyre and its major tributaries for a range of undefended and defended flood event scenarios. It will be important that hydraulic modelling information is supplemented by known flood records that may have taken place after the modelling was completed, including the December 2015 floods, which affect villages such as St. Michaels.

2.2.3 Functional Floodplain

Flood Zone 3b, known as the 'Functional Floodplain', is defined in Table 1 of the NPPG as those areas in which "*water has to flow or be stored in times of flood*". The definition of functional floodplain remains somewhat open

¹ <http://maps.environment-agency.gov.uk/wiyby>

² Environment Agency North West Region (2015) Lancashire Tidal Areas Benefitting from Defences Revisited Study

³ Environment Agency North West Region (2015) Lancashire Tidal Flood Risk Mapping – Final Breach Report

⁴ Environment Agency North West Region (2015) River Wyre Strategic Flood Risk Mapping Study

to subjective interpretation, but the NPPG requires that the boundaries shown in the SFRA should be as agreed with the Environment Agency.

The NPPG states that:

“The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. However, land which would flood with an annual probability of 1 in 20 (5%) or greater in any year, or is designed to flood (such as a flood alleviation scheme) in an extreme (0.1% annual probability) flood, should provide a starting point for consideration and discussion to identify the functional floodplain”, (NPPG, SFRA guidance, paragraph 015).

The guidance further clarifies that:

“The area identified as functional floodplain should take into account the effects of defences and other flood risk management infrastructure. Areas which would naturally flood, but which are prevented from doing so by existing defences and infrastructure or solid buildings, will not normally be identified as function floodplain.”, (NPPG, SFRA guidance, paragraph 015)

In addition, the guidance states that areas intended to flood, such as flood storage areas should also be identified as functional floodplain. There are two FSAs within Wyre Borough at Garstang and St. Michaels/Catterall.

No new hydraulic modelling has been carried out as part of this Level 2 SFRA.. The functional floodplain (Flood Zone 3b) has therefore been defined using the following criteria:

- a) Land subject to flooding in the Environment Agency modelled fluvial and tidal flood events
 - i. 3.33% AEP (1 in 30-year) tidal event
 - ii. 5% AEP (1 in 20-year) fluvial event
- b) Land where water has to flow or be stored in times of flood
 - i. Garstang FSA and St. Michaels/Catterall FSA
- c) And from these areas, removing;
 - i. Land already benefitting from flood defences
 - ii. Currently developed land where it is difficult to identify its current flood storage function
 - iii. Future development sites with planning permission
 - iv. Major transport infrastructure (e.g. motorways and railways)
 - v. Dry islands' defined using the 'size standards' within the Environment Agency Strategic Flood Risk Management (SFRM) Specification for Flood Risk Mapping⁵

⁵ Environment Agency (2006) Strategic Flood Risk Management Specification for Flood Risk Mapping. Release 1.2

Published Flood Zones (Figures 1.1 to 1.7)

This map illustrates the extent of Flood Zone 3 and 2 and the delineated Flood Zone 3b (the Functional Floodplain). The map also illustrates the location of Main Rivers, Ordinary Watercourses, flood defences, ABDs and FSAs. This map should be used as a high-level identification of proposed development sites at risk and the initial application of the Sequential Test.

Undefended Flood Depth Map (Figures 3.1 to 3.7)

Undefended 1% AEP (1 in 100-year) fluvial and 0.5% AEP (1 in 200-year) tidal flood event depths. These maps should provide an early identification of the variation of risk throughout the Flood Zone 3. Maps also illustrate the extent of flooding during undefended fluvial and tidal climate change scenarios (see Section 2.2.10).

Defended Flood Depth Map (Figures 4.1 to 4.7)

Defended 1% AEP (1 in 100-year) fluvial and 0.5% AEP (1 in 200-year) tidal flood event depths. Maps help identify the actual risk of flooding. Maps also illustrate the extent of flooding during defended fluvial and tidal climate change scenarios and therefore help identify where defences are overtopped or bypassed as a result.

These maps should be used during the Sequential Test and provide the evidence to inform the likelihood of sites passing the Exception Test. Sites situated in communities with high depths and/or hazards should be avoided and would find it difficult the pass the Exception Test.

Defended Breach Scenario Flood Depth Map (Figures 6.1 to 6.3)

Defended 0.5% AEP (1 in 200-year) tidal event breach scenarios at Knott End West Esplanade, Broadfleet Penstocks, Stanah Embankment at Hillylaid Pool and Kiln Lane at Wardley’s Creek. Development within areas identified at risk should be investigated further during a site-specific FRA.

Undefended Flood Hazard Map (Figures 7.1 to 7.7)

Undefended 1% AEP (1 in 100-year) fluvial and 0.5% AEP (1 in 200-year) tidal flood event hazards. Maps help provide a guide to the risk to people from a combination of predicted flood depth and velocity.

Defended Flood Hazard Map (Figures 8.1 to 8.7)

Defended 1% AEP (1 in 100-year) fluvial and 0.5% AEP (1 in 200-year) tidal flood event hazards. Maps help provide a guide to the risk to people from a combination of predicted flood depth and velocity.

Flood hazards have been defined in accordance with Defra Guidance: Flood Risk Assessment Guidance for New Development; FD2320/TR2. Table 2.1 presents a summary of the flood hazard classifications.

Table 2.1 : Flood hazard classification

Classification	Degree of Hazard	Description
Low	Caution	Flood Zone with shallow flowing or deep standing water
Moderate	Dangerous for some	Danger: flood zone with deep or fast flowing water
Significant	Dangerous for most	Danger: flood zone with deep fast flowing water
Extreme	Dangerous for all	Extreme danger: flood zone with deep fast flowing water

2.2.4 Surface Water Flood Risk

The risk of surface water flooding has been based upon the updated Flood Map for Surface Water (uFMfSW) developed by the Environment Agency. This assesses surface water flood extents, depths, velocity and hazard for the 3.3% AEP (1 in 30-year), 1% AEP (1 in 100-year) and 0.1% AEP (1 in 1,000-year) rainfall events.

Updated Flood Map for Surface Water (Figures 2.1 to 2.7)

As a key deliverable of this Level 2 SFRA, surface water flood extents have been mapped for the 3.3% AEP (1 in 30-year), 1% AEP (1 in 100-year) and 0.1% AEP (1 in 1,000-year) flood events.

2.2.5 Sewer Flooding

United Utilities are the water company responsible for the management of the public sewer system within the borough. Figure 9-4 of the 2015 Level 1 SFRA includes a heat map of historical instances of internal hydraulic flooding throughout the borough. Instances of flooding are not publically available at a property level; therefore, the map provides a high-level indication of the degree of risk for a particular community.

As part of their ongoing drainage area programme, United Utilities have constructed hydraulic models covering the majority of their sewer network through the borough. A series of design storms representing rainfall events of different return periods were applied to the models with the surcharging volume at individual model nodes (manholes) recorded. United Utilities supplied the model outputs to the Council as a GIS layer to inform this Level 2 SFRA. However, as United Utilities have not verified the modelled flows and outputs, this output data has not been illustrated on one of the Level 2 SFRA Flood Maps.

2.2.6 Groundwater Flood Risk

The risk of groundwater flooding to potential development sites has been assessed using the Environment Agency's Areas Susceptibility to Groundwater Flooding (AStGWF) mapping. The AStGWF is a strategic scale map indicating the risk of groundwater flooding for each 1km grid square. The data provides an indication of the proportion (%) of each grid square that is susceptible to ground water emergence. Figure 9-3 of the 2015 Level 1 SFRA illustrates the AStGWF map.

2.2.7 Canal Flooding

The Lancaster Canal passes through the borough and for the majority of its course it is at surrounding ground level with a few sections on raised embankments. Figure 9-5 of the 2015 Level 1 SFRA illustrates the location of historical breaches along the Lancaster Canal. This has been reviewed along with recent events in Winter 2015 to assess risk to potential development sites.

2.2.8 Reservoir Failure

The risk of reservoir failure to potential development sites has been assessed using the Environment Agency's Risk of Flooding from Reservoirs map¹, which identifies areas that are at risk of inundation as a result of dam failure. The mapping does not take into account the risk of failure of smaller reservoirs (less than 25,000m³ in volume), which could add further risk of flooding from such structures not currently mapped. Where possible these have been identified using OS mapping, but the risk of flooding from these smaller reservoirs to a development site will need to be considered within the site-specific flood risk assessment.

2.2.9 Critical Drainage Areas

Critical Drainage Areas (CDAs) are used to identify particular sensitive catchments, where due to a particular set of local circumstances, changes in surface water runoff can have significant impacts on areas already at risk of surface water flooding.

Local Authorities may designate their own CDAs where for example there are surface water capacity issues or undersized culvert on Ordinary Watercourse, where surface water run-off from new development can exacerbate existing problems.

Whilst these areas would require further detailed investigation through Surface Water Management Plans (SWMPs) to understand complex flood mechanism or the sensitivity of the catchment to change, in the meantime would benefit from tighter controls on acceptable run-off rates from new development in order to manage existing flood risk levels or provide betterment where possible.

This Level 2 SFRA has identified CDAs where:

- There is historical evidence of surface water flooding;
- Predictive flood risk datasets identify a high risk of flooding from direct rainfall, sewers, urban watercourses; and
- Where there is a high density of new development or regeneration proposed that could have a significant impact on surface water run-off to local watercourses and the sewer network.

This SFRA has not defined the boundary of each CDA. Rather the community assessments documented in Section 3 list the location name and the reasons for their classification.

2.2.10 Consideration of Climate Change

Climate change has the potential to increase the consequences of flooding within the borough. The assessment of flood risk has taken into account the estimated impact of climate change up to the year 2115. This has been assessed for both changes in rainfall leading to an increase in fluvial flood risk due to higher river levels and the impact of higher tidal water levels. This has the potential to increase the current risk of flooding through an increase in rainfall frequency and intensity. The frequency of high water levels on the River Wyre (and other watercourses) is also expected to increase.

In February 2016, the Environment Agency updated their climate change guidance⁶ on the uplift factors to be applied in SFRAs (and FRAs) to account for the predicted impacts of climate change to peak river flows, peak rainfall intensity, sea level rise, offshore wind speed and extreme wave height. The uplift factors to be applied for peak river flow are specific to UK River Basin Districts (RBD), the borough lies within the North-West RBD. Table 2.2 summaries the uplift factors to be applied in the borough.

Table 2.2: North West RBD Climate Change Allowances – Peak Flow and Rainfall

Factor	Allowance category	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)
River Flow	Upper end	20%	35%	70%
	Higher central	20%	30%	35%
	Central	15%	25%	30%
Rainfall Intensity	Upper end	10%	20%	40%
	Central	5%	10%	10%

Wave heights may increase due to increased water depth as a result of climate change as could the frequency, duration and severity of storms. The application of the wave height factors will also need to consider a sensitivity test to indicate an appreciation of the range of potential impact.

⁶ <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

Table 2.3: North West RBD Climate Change Allowances – Sea Level Rise and Extreme Wave Height

	1990-2025	2026-2055	2056-2085	2086-2115	Cumulative Rise 1990 - 2115
Sea Level Rise					
Per Year (mm)	2.5	7	10	13	990
Cumulative (mm)	87.5	210	300	390	
Extreme Wave Height					
Allowance		+5%		+10%	-
Sensitivity Test		+10%		+10%	-

The application of the river flow and rainfall intensity allowances is dependent upon the vulnerability classification (as stated in Table 2, paragraph 066 of the NPPG) of the development proposed, the Flood Zone in which it is located and the lifetime of the development. The guidance is summarised in Table 2.4.

Table 2.4: Application of Allowance by Vulnerability Classification

Flood Zone	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
2	Higher central and upper end to assess a range of allowances			Central	
3a	Upper End	Should not be permitted	Higher central and upper end to assess a range of allowances	Central and higher central to assess a range of allowances	Central
3b	Upper End	Should not be permitted			Central

As the majority of the high-risk urban areas in the borough are currently protected by existing flood defence assets, the Environment Agency will expect to see the application of High++ allowances⁷ for peak river flow and sea level rise. This would especially be the case where the proposed development is particularly vulnerable to flooding and has a lifetime beyond the end of the century e.g. infrastructure projects or developments that “significantly change existing settlement patterns”. At present, neither type of development is currently proposed within the borough.

Climate Change Mapping (Figures 3.1 to 3.7 and 4.1 to 4.7)

Figures 3.1 to 4.7 illustrate the spatial impact of climate change on fluvial and tidal flood hazard. Climate change flood extents provided in this Level 2 SFRA have been taken directly from existing Environment Agency hydraulic modelling studies including the:

- River Wyre Strategic Flood Risk Mapping Study (2014); and
- Lancashire Tidal Areas Benefitting from Defences Revisited Study (2015).

These studies were carried out prior to the release of the revised guidance and therefore the climate change flood extents use the following climate change allowances from UKCP09:

- +20% on fluvial river flows for the 1% AEP event; and
- +700mm on tidal sea level rise from 2012 to 2115 based upon the medium emission 95th percentile scenario.

⁷ [Adapting to Climate Change. Environment Agency. 2011](#)

3. Community Assessments

3.1 Introduction

The Council have identified a number potential development sites across the borough. The final list of preferred sites has yet to be confirmed through the Local Plan as the final selection of sites is partly dependent upon flood risk implications for each i.e. the application of the risk based sequential approach.

The Council has undertaken a substantial amount of the background work for the Level 2 SFRA in house including a review of each potential development site in terms of their flood risk and vulnerability classification, Sequential and Exception Test requirements, potential discharge options and drainage calculations, and suitable flood mitigation measures. The Council have documented their review in Site Proformas.

To supplement the work already undertaken by the Council, this Level 2 SFRA focuses on providing further detailed information of flood hazard, taking account of the presence of flood management assets such as flood defences as discussed in Section 2.2. In order to present this information at the right level, the Level 2 SFRA has split the borough into four distinct Community Areas, encompassing broadly homogenous characteristics and development requirements in terms of flood risk. Flood Mapping has also been provided representing a GIS data collected.

Together, the four supplementary documents listed below, will ensure that all users have enough information to apply to risk based sequential approach to development at all levels of the planning process. The three key intended users of this information are described below.

- 1) Level 1 SFRA
- 2) Level 2 SFRA Report and Community Assessment
- 3) Level 2 SFRA Flood Maps
- 4) Development Site Proformas

3.1.1 Spatial Planners

These documents aim to provide spatial planners with sufficient information to apply the Sequential Test, especially where the existing Flood Zones do not offer enough detail to understand the complex geographical distribution of flood risk from multiple sources across a single high-risk area. Spatial planners should:

- a) Use the Site Proformas to undertake the Sequential Test on proposed development sites and avoid sites at high risk;
- b) Identify sites where a more detailed understanding of flood risk is required to inform this test;
- c) Use the Community Assessment and the Flood Maps to identify the likelihood of sites passing the Exception Test if allocated i.e. to assess the level of risk to the site and the likelihood of it remaining safe;
- d) Allocate appropriate development through the Sustainability Appraisal and support the decisions made to avoid, substitute or allocate the site; and
- e) Use the recommendations provided in this Level 2 SFRA to draft flood risk policies and develop guidance on each allocated site within the Sustainability Appraisal e.g. the requirement for site-specific FRAs and site-specific mitigation.

3.1.2 Development Management

These documents aim to provide development management officers with sufficient information to respond to individual planning applications.

For sites allocated for development in the Local Plan, the Council will have applied the Sequential Test and development management officers should:

- a) Use the Site Proformas to review flood risk levels to the site;
- b) Use the Community Assessments and the Flood Maps to assess whether the site-specific FRA is acceptable (meets the Exception Test if required), e.g.:
 - i. All sources of risk present have been considered;
 - ii. Proposed mitigation measures are acceptable considering national and local policies; and
 - iii. Residual risks have been managed.
- c) Consult with the Environment Agency and other Risk Management Authorities (RMAs) over site-specific FRA acceptance/approval.

For Windfall Sites not allocated for development in the Local Plan, development management officers should:

- a) Review the site-specific FRA for evidence that Sequential Test has been applied;
- b) Use the Flood Zone Maps and the NPPF to check that the development vulnerability matches the Flood Zone that is proposed within and if the Exception Test is applicable.
 - i. Where the Exception Test is applicable, there is evidence that the development provides wider sustainability benefits to the community that outweigh flood risk.
- c) Use the Community Assessments and the Flood Maps to assess whether the site-specific FRA is acceptable, e.g.:
 - ii. All sources of risk present have been considered including an allowance for climate change;
 - iii. Proposed mitigation measures are acceptable considering national and local policies; and
 - iv. Residual risks have been managed.
- d) Consult with the Environment Agency and other RMAs over site-specific FRA acceptance/approval.

3.1.3 Developers

These documents aim to provide developers (or those working on their behalf) with sufficient evidence to prepare site-specific FRAs. Developers should:

- a) Use the Flood Zone Maps to apply the Sequential Test to the proposed development site;
- b) Use the Flood Zone Maps and the NPPF to check that the development vulnerability matches the Flood Zone that is proposed within and if the Exception Test is applicable.
 - i. Where the Exception Test is applicable, provide evidence that the development provides wider sustainability benefits to the community that outweigh flood risk.
 - ii. Where sites fall partially in Flood Zone 2 and/or Flood Zone 3, consider the sequential approach to site layout and place development elements that are “more vulnerable” in Flood Zone 1.
- c) Consult with the Environment Agency and other RMAs regarding the appropriateness of the site, data availability and Site-specific FRA requirements.
- d) Use the Community Assessments and the Flood Maps to identify all sources of flooding present, which should include an assessment of:
 - i. Actual flood risks levels;
 - ii. Residual flood risk levels; and
 - iii. Climate change impacts.
- e) Use the recommendations provided in this Level 2 SFRA to set out appropriate migration measures to ensure the development will remain safe over its lifetime.
- f) Document all work in a site-specific FRA report in support of the planning application.

3.2 Community Assessment 1: Coastal Peninsula

3.2.1 Introduction

The Coastal Peninsula Community Area focuses on the main urban towns including Fleetwood, Thornton, Cleveleys and Poulton-le-Fylde. Sites identified for potential development include previously undeveloped land around Poulton-le-Fylde for housing and existing docklands and industrial sites along the Wyre estuary for housing and employment. As the main urban area within the borough, the coastal peninsula is in continual need of investment and regeneration. The Council considers development in this area vital in delivering significant growth and infrastructure investment.

3.2.2 Flood Risks

Coastal Flooding

The Environment Agency's Flood Zone 3 and 2 mapping (Figures 1.1 to 1.7) identifies large parts of the coastal peninsula at risk flooding. According to hydraulic modelling undertaken by the Environment Agency, the source of flooding includes both coastal flooding directly from wave overtopping, flood inundation from the Irish Sea and still water flooding from the River Wyre.

In Fleetwood, Flood Zone 3 and 2 identifies residential areas around Hatfield Avenue and industrial units off Corpse Road along the Wyre estuary and docklands at risk. This includes a number of proposed development sites along the Wyre estuary. In the undefended scenario, flood depths along Hatfield Avenue reach 0.90m in the 0.5% AEP (200-year) tidal event and up to 1.10m in the 0.1% AEP (1,000-year) event.

At Cleveleys, the Flood Map identifies existing residential and commercial properties within Flood Zone 2 and therefore at medium risk of tidal flooding directly from the coast. During this event flood depths can reach 1.00m.

At Thornton, there is very little difference between Flood Zones 2 and 3, with tidal flooding from the Wyre estuary predicted to affect large parts of Red Marsh Industrial Estate at risk along the Wyre estuary. Inland, floodwater is also predicted to inundate the railway line and Kneps Farm Holiday Park downstream of the Springfield pumping station at Stanah, including the large residential estates surrounding the Stanah Road (B5412).

In the undefended scenario, flood depths are greatest along urban watercourses and on Lawsons Road where they can reach 1.80m in the 0.5% AEP (200-year) tidal event and up to 2.00m in the 0.1% AEP (1,000-year) event. There are sections of higher ground around Burn Naze that are not at risk of flooding. The key proposed development site at risk here is the Hillhouse Enterprise Zone identified for employment use.

Flooding from Urban Watercourses

Parts of the coastal peninsula are also at risk from a number of urban watercourses including Burn Drain, Copse Brook, Hillylaid Pool, Horsebridge Dyke, Main Drain, Oldfield Carr Lane Watercourse, Royles Brook and Springfield Brook.

The majority of Copse Brook has been diverted and culverted due to very significant development associated with the Port of Fleetwood. Copse Brook is also a discharge point for surface water sewers and can increase the risk of surface water flooding during tide locked conditions. Although this is unlikely to occur due to the large culvert capacity. Springfield Brook effectively drains the South East part of Fleetwood. It is a tide locked system, which is reliant on a pump located at Cala Gran Caravan Site to discharge water through a rising main across the former ICI Site and into the River Wyre. According to the Council's Land Drainage Strategy⁸, the pump was upgraded following a flood event in 2000.

⁸ Wyre Borough Council (2004) Land Drainage Strategy

Hillylaid Pool and Royles Brook are small to medium sized watercourses, draining the flat and low-lying Stanah, Norcross, Thornton, Trunnah and Poulton-le-Fylde areas and discharge into River Wyre at Stanah. Royles Brook joins Hillylaid Pool approximately 400m upstream of Stanah Clough. The catchments of both watercourses are heavily urbanised and rise rapidly during periods of heavy rainfall.

Stanah Pumping Station, located at the bottom end of the catchment in Stanah Clough, was installed in the 1970s following significant flooding to several low-lying areas. The pumping station automatically activates when levels rise in Hillylaid Pool to contain water levels within the watercourse. According to an Environment Agency hydraulic modelling study⁹, when Stanah Pumping Station is operating effectively and all critical structures are clear of blockage, there is no significant risk to property, with the exception of the areas upstream of Amounderness Way within the Hillylaid Pool catchment. The Council are currently undertaking a combined impact assessment for Stanah Pumping Station, which will be investigating the links between the sewerage system, the highway drainage and Stanah Clough and the benefits the pumping station currently provides.

Surface Water Flooding

Surface water flooding includes pluvial (direct rainfall) and sewer flooding. The results of the strategic assessment have been used to define CDAs at the end of this section.

Pluvial Flooding

The uFMfSW (Figures 2.1 to 2.7) shows that the greatest risk of pluvial flooding lies in the south, surrounding the towns of Thornton and Poulton-le-Fylde particularly along urban watercourses. According to the dataset, any development sites located in the north around Fleetwood and the coastal areas to the west will generally be at lower risk of pluvial flooding, with the majority of sites likely to intersect only minor overland flow paths or areas of localised ponding.

During the 3.33% AEP (1 in 30-year) rainfall event, the uFMfSW shows that potential development sites to the south of the A585 would be at highest risk of flooding, although the risk mainly arises from areas of localised ponding, rather than any prominent overland flow paths. The risk of pluvial flooding is lower in the centre and south of the coastal peninsula, which includes potential sites in Thornton, the Hillhouse Enterprise Zone and the Red Marsh Industrial Estate, although these are still at risk of ponding. Sites in the north and far west, however, lie outside of the predicted flood extents.

The highest risk of pluvial flooding during the 1% AEP (1 in 100-year) rainfall event is shown to occur in the far southwest of the coastal peninsula, in the location of four potential development sites, including Brockholes Crescent, Holts Lane, South Poulton-le-Fylde and the potential Greenbelt release. Elsewhere in the central and southern regions, the extent of ponding is slightly larger than that shown in the 3.33% AEP (1 in 30-year) rainfall event. Minor overland flow paths are also predicted in these areas.

During the extreme 0.1% AEP (1 in 1,000-year) rainfall event, ponding and minor overland flow paths start to develop in the north of Fleetwood and the extent of ponding increases. Prominent overland flow paths that form in the far southwest corner of the Community Area also place a number of sites at high risk of flooding, including South Poulton-le-Fylde, which is at risk of flooding from an overland flow path that follows the Poulton railway embankment.

Sewer Flooding

The 2015 Level 1 SFRA¹⁰ identifies the coastal peninsula as being particularly susceptible to sewer flooding. The majority of the sewer network is separated, with surface water sewers relying on being able to discharge to watercourses. However, due to the predominantly flat topography in the area, surface water sewers have low hydraulic gradients, which prevent them from being able to effectively discharge into the receiving watercourses. As result, surface water is unable to drain effectively causing a number of flooding issues.

⁹ Environment Agency (2012) Hillylaid and Royles brook Hydraulic Modelling Study

¹⁰ Wyre Borough Council (2015) Level 1 Strategic Flood Risk Assessment

There is also a risk that these receiving local watercourses cannot discharge into the Wyre estuary at times of high tide, which will result in surcharged surface water sewers and highway drainage, and local flooding. Historical flooding problems have been noted in the areas surrounding the Stanah residential area, Poolfoot Farm, Fleetwood Docks and the area to the west of the railway track.

Critical Drainage Areas

Areas at significant risk of flooding from surface water sources including pluvial (direct rainfall), urban watercourses and sewer flooding, have been define CDAs. Table 3.1 describes the CDAs identified in the Coastal Peninsula Community Area.

Table 3.1 : CDAs – Coastal Peninsula

CDA	Reasoning
Thornton	According to both predictive and historical flood risk datasets collected during the preparation of this SFRA, the area of Thornton is at high risk of surface water flooding. The urban drainage network in this area is complex, with a number of interacting networks ultimately discharging into the Wyre estuary. The area has a relatively flat topography, which results in low hydraulic gradients, that require flood assist pumping stations to discharge into the estuary particularly during periods of high tide. The problem is further exacerbated by the local drainage and surface water sewer systems, which discharge into urban watercourses, adding to the volume of water that cannot drain into the estuary. This results in the drainage and sewerage systems in the area surcharging. The 2007 SFRA also identifies a number of key drainage assets in the area, which are classified as having a medium and high risk of flooding due to the failure of the EA/Wyre BC pumping stations and partially collapsed sections of watercourse, which increase the risk of surcharge from sewer/drainage systems. Presently, nine development sites are proposed within this area, which, if developed, could contribute to the existing flood risk issues in this area if drainage is uncontrolled. Development could also be reliant on existing surface water drainage infrastructure including the flood assist pumping stations.
Poulton-le-Fylde	According to both predictive and historical flood risk datasets collected during this SFRA, the area of Poulton-le-Fylde is at high risk of surface water flooding. The main source of flooding in the area is from surface water due to the low hydraulic gradients of the drainage network and tide locking of local watercourses at key outfalls, which prevent the surface water from being drained effectively.

Groundwater

The Wyre Catchment Flood Management Plan (CFMP)¹¹ does not consider groundwater flooding to be a significant issue within the coastal peninsula due to its underlying geology and the lack of historical flooding incidents from this source. However, the ASStGWF flood map (Level 1 SFRA Figure 9-3) does shows that the probability of groundwater flooding is higher in the south than in the north. Specifically, the risk of groundwater flooding is shown to be very high in the Carleton, Norcross and Normoss area, potentially due to a high water table and the low-lying nature of the land. These villages are confined to the far southwest corner of the coastal peninsula, where only one proposed development site is currently proposed (Greenbelt release at Poulton-le-Fylde).

The probability of groundwater flooding is shown to be high in Poulton-le-Fylde, as well as in two isolated pockets of land in the far north of the coastal peninsula, although only the potential development site in the Fleetwood Docks area is considered susceptible to groundwater flooding. The probability of future groundwater flooding tends to be lower in the north of the study area, where more than half of the potential development sites are located. Although there could be local-scale features in these locations influencing the risk of groundwater flooding, that the national-scale dataset cannot accurately determine.

The 2015 Level 1 SFRA identifies a number of land parcels within the 'Core Development Area' that could be susceptible to groundwater flooding. Those of relevance to this SFRA include an area to the west of the railway track (lagoon area), which contains four of the proposed development sites in the coastal peninsula, the

¹¹ Environment Agency (2009) Wyre Catchment Flood Management Plan

Poolfoot Farm area, containing a potential development site along Red Marsh Industrial Estate and the Stanah residential area, which includes a potential development along Roscoe Avenue.

Canal flooding

Given the geographical distance of the nearest canal (Lancaster Canal) to the coastal peninsula, the risk of flooding from this source to the area is extremely low and it will not be a development constraint in this area.

Reservoir flooding

The Environment Agency's reservoir flood map shows that the whole of the coastal peninsula, including all 46 potential development sites, lie outside of the predicted extent of reservoir flooding. This includes any large reservoirs located outside of the study area that could potentially pose a risk of flooding.

There are, however, a number of smaller reservoirs (less than 10,000m³), that the Environment Agency's reservoir flood map does not take into account. This includes a small reservoir to the east of Copse Road in Fleetwood, which, in the event of sudden breach, has the potential to channel large volumes of water at high velocity towards two proposed development sites around Copse Road. The Site Proformas will not have identified the risk from smaller reservoirs, so it will be important that this is covered during site-specific FRAs.

3.2.3 Flood Risk Management

Existing Infrastructure

Whilst the Environment Agency Flood Zone Map identifies large parts of the coastal peninsula at risk, a network of existing embankments, revetment systems, sea walls currently protect the majority of the area from flooding up to a standard of protection of between a 1.33% AEP (1 in 75-year) and 0.5% AEP (1 in 200-year) flood event. Figures 3.1 to 3.7 contain mapping illustrating the location of the existing assets, areas currently protected and residual flood depths during the 1% AEP (1 in 100-year) fluvial and the 0.5% AEP (1 in 200-year) tidal event. These maps show that large areas of the coastal peninsula are not at direct risk of fluvial and coastal flooding providing the integrity of the defences are maintained.

The Wyre Coastal Defence Strategy identifies works required to ensure the integrity of the coastal defences over the next century. This involves a continued significant investment in the defences. Without this investment, there is a significant risk of breach failure, as well as long-term risks associated with defence overtopping should the predicted impacts of climate change on tidal levels occur. Figures 6.1 to 6.7 contain maps illustrating the impacts of breaches along key flood defences assets.

In addition to these, there are also pumping stations along the urban watercourses to reduce the risk of fluvial flooding during high tides and to improve the hydraulic gradient of the system. As these urban watercourses are interconnected to surface water sewers and highway drainage systems, it is believed that these pumping stations also help reduce the risk of surface water flooding. The residual risk of flooding from these urban watercourses is high due to low channel capacities, inadequately sized structures, potential blockages, siltation, bank collapses, and pumping station and tidal flap failure.

Planned Infrastructure Investment

In order to sustain the urban area, which is reliant on existing flood risk management infrastructure, there is a long-term aspiration to maintain existing defences and major assets to their current standard of protection and improve assets to an appropriate standard where they fail to meet their target condition.

At a regional level, the Wyre CFMP and the Shoreline Management Plan (SMP2¹²), both propose policies to hold the line or to take further action to reduce flood risk. At a local level, the Wyre Urban Core Strategy¹³

¹² North West & North West Wales Coastal Group (2011) North West & North West Wales Shoreline Management Plan SMP2

¹³ Wyre Borough Council (2013) Wyre Urban Core Strategy – Strategy Appraisal Report

outlines the desired approach to flood risk management in the coastal peninsula, which includes the upgrade, maintenance and replacement of existing defences.

The implementation of these plans and strategies is therefore likely to manage actual and residual flood risks over the long-term and whilst it is not the intention of these to open up land for development, flood defences in this area will inevitably manage risks to allow development to come forward. However, the Environment Agency and the Council need to continue investing in the implementation of the approved strategies in order to manage actual and residual flood risk levels.

3.2.4 Planning Consideration

Whilst the existing Flood Zones cover large parts of the area, the actual risk of flooding from fluvial and tidal sources is not as extensive due to the presence of existing flood defences. The area is at risk from other local sources of flooding including surface water from the urban drainage network.

As a result, this SFRA considers flood risks not to be a major environmental constraint to any strategic development aspirations in the coastal peninsula. Development could actually provide a number of opportunities to reduce flood risk to the existing community if strategically planned alongside the Wyre Urban Core Flood Management Strategy. However, ad-hoc development will limit the ability to achieve wider benefits and could increase risks by adding pressure on the existing drainage network.

The Sequential Test

In the first instance, the Council should apply the Sequential Test to all proposed development sites to confirm there are no suitable alternatives on land with a lower probability of flooding. This SFRA recommends that the Council apply the Sequential Test to the whole of the borough.

Table 3.2 outlines the number of proposed housing, employment and mixed-use development sites in the coastal peninsula in relation to Flood Zone 2 and 3. Appendix B contains a full breakdown of each proposed development site against a range of flood risk datasets. According to Table 3.2, there are 46 sites proposed in the coastal peninsula; 70% are located in Flood Zone 3 and a further 11% in Flood Zone 2. This equates to approximately 558.1 hectares of proposed development sites at risk of either fluvial or tidal flooding.

Table 3.2 : Proposed Development Sites at Risk – Coastal Peninsula

Development Type	Community Area		Flood Zone 2		Flood Zone 3		Benefitting from Defences	
	Number	Hectares	Number	Hectares	Number	Hectares	Number	Hectares
Housing	27	160.4	3	6.6	16	119.0	14	80.5
Employment	12	132.9	0	0.0	11	131.8	9	124.5
Mixed Use	7	300.7	2	58.2	5	242.5	5	242.5
Total	46	594.0	5	64.8	32	493.3	28	447.4

If the Council applied the Sequential Test in its simple form and avoided allocating development in medium to high flood risk areas altogether, only nine development sites at low risk of flooding within Flood Zone 1 would remain.

Applying this strict approach to flood risk avoidance could affect the growth needs for this Community Area and the Council's wider development aspirations for the borough.. Within this particular area, it may also be difficult to substitute More Vulnerable development into areas of lower risk, as eleven of the twelve sites earmarked for employment are already located in Flood Zone 3.

Strategically, the Council should focus housing (More Vulnerable) development around Poulton-le-Fylde where flood risk is at its lowest outside the Flood Zones. This includes large open land around Carleton and Hardhorn.

Housing development along the Wyre estuary could be acceptable following the application of the Exception Test, which should consider actual flood risk levels and the long-term flood management strategy for the area.

Large sites currently identified for employment (Less Vulnerable) use along the Wyre estuary, such as the Hillhouse Secure Economic Development Zone, will be suitable for development from a flood risk perspective. Whilst the Exception Test will not be applicable for employment sites, this SFRA recommends that the Council still consider whether the site could remain safe over its lifetime. A more detailed development and flood risk management strategy for these large sites may be beneficial.

The Exception Test

If, following application of the Sequential Test, it is not possible to meet local and regional housing needs within those eleven sites already identified for housing in Flood Zone 1 and Flood Zone 2, the Council should consider allocating housing development in the remaining 32 sites in Flood Zone 3. In these instances, the Exception Test will be applicable.

It is likely that development in the coastal peninsula will provide wider sustainability benefits to the existing community that outweigh flood risk and therefore meet the first criteria of the Exception Test. Before allocating the sites for development, at the strategic planning stage the Council should consider whether the site would meet the second criteria of the Exception Test; would the development will be safe for its lifetime, without increasing flood risk elsewhere and where possible reduce flood risk overall?

Without a site-specific FRA, it would not be possible to truly state whether the site will meet this criterion. However, there should be enough information contained in this SFRA to assess the likelihood of this being achieved before the site is allocated.

The key to understanding this is the appreciation of actual and residual flood risks (i.e. with flood defences in place), and how the existing community will be safe guarded against flooding from the River Wyre and the coast over the long-term. For example, Table 3.2 outlines the number of development sites within Flood Zone 3, but also those benefitting from defences. This table shows that out of the sixteen residential developments in Flood Zone 3 (and requiring the Exception Test); existing defences currently protect fourteen up to a 1% AEP (1 in 100-year) fluvial or 0.5% AEP (1 in 200-year) tidal flood event. This significantly alters the understanding of flood risk in these areas.

Within this Community Area, this SFRA recommends that the Council consider the following issues outlined in Table 3.3 prior to the allocation of development sites in medium to high-risk areas (Flood Zone 2 and 3).

Table 3.3 : Flood Risk Considerations – Coastal Peninsula

Flood Risk Considerations	Comments
Are there other sources of risk present?	Yes, area is at risk of surface water flooding from pluvial, urban watercourses and sewer sources. Uncontrolled development in these areas could place further pressure on the existing drainage network, which is known to have capacity issues and reliant on existing pumping stations.
Is the site currently protected and to what standard?	Yes, existing flood defences protect large parts of the coastal peninsula up to a 1% AEP (1 in 100-year) fluvial or 0.5% AEP (1 in 200-year) tidal flood event. The Environment Agency Flood Warning service also covers areas at risk.
Is there a significant probability of assets breaching or overtopping?	Yes, sections of flood defences are in poor condition and breach scenarios show areas at risk. Climate change impacts could also result in assets overtopping and reaching capacity over the lifetime of the development.
Could climate change impacts increase the risk of these assets overtopping?	Yes, the risk of flooding is likely to increase overtime as sea levels rise reducing the standard of protection offered and increased rainfall in sensitive areas overwhelms existing drainage systems and pumping stations.
Is there a long-term flood management strategy in place?	Yes, the Wyre Urban Core Strategy, which is broadly in line with the policy recommendations of both the Wyre CFMP and the SMP2, identifies the long-term flood management approach in this area is to maintain, upgrade or replace of existing defences.

Flood Risk Considerations	Comments
Are there opportunities for new development to support this strategy or reduce the cause and impact of flooding?	Yes, proposed development in this area, specifically those along the Wyre estuary, could have a major role to play in reducing existing flood risks. This could include implementing short-term measures or supporting the Wyre Urban Core Flood Management Strategy.

3.2.5 Flood Risk Assessments

For those sites allocated for development in a flood risk area, a detailed site-specific FRA will be required to accompany any individual site planning proposals. The level of FRA will be dependent on the nature of flood risk present as presented in Table 3.4.

Table 3.4 : Flood Risk Assessment Requirements – Coastal Peninsula

Flood Zone	Local Considerations
Flood Zone 1	A Level 1 FRA is required for all sites greater than 1ha in area. These should focus on the identification of 'other' sources of flooding using information contained in this SFRA and historical flood records.
Critical Drainage Area (in addition to any Flood Zone specific requirements)	Developers should undertake at least a Level 2 FRA for all sites in Fleetwood and Poulton-le-Fylde due to the high risk of surface water flooding. The FRA should assess risk from pluvial, urban watercourses, and sewer flooding. SuDS should be a high priority to reduce pressure on existing drainage system as well as blue / green infrastructure along urban watercourses.
Flood Zone 2/3a Undefended Areas	A detailed Level 3 FRA will be required to assess risk from all sources, but particular focus should be on fluvial and tidal sources.
Flood Zone 3b	All development in Flood Zone 3b should be avoided. Where only part of the site is within Flood Zone 3b, it is recommended a detailed Level 3 FRA is undertaken. The primary flood management approach should be the sequential approach to site layout. The removal of any functional floodplain would be prohibited.
Areas Benefitting from Defences	A detailed Level 3 FRA should be undertaken for all sites located in areas currently benefitting from defences. Defended fluvial and tidal flood depths and extents provided in this SFRA should be used to assess actual risk to the site. Where a site is already benefitting from defences, residual flood risks should be addressed including risk of defence breaching, overtopping or pump failure. Existing hydraulic models are already available from the Environment Agency to undertake this assessment. However, climate change scenarios will have to be updated in line with current guidance.

3.2.6 Flood Risk Management Measures

FRA should consider appropriate mitigation measures given the source and level of flood risk, existing assets and in accordance with the Council's Flood Risk Policy, the Wyre Land Drainage Strategy, the Wyre CFMP, the SMP2 and the Wyre Urban Core Flood Management Strategy.

Whilst new development should not be reliant on existing assets being maintained by others or on the actions of the strategy to be implemented, those carrying out FRAs should be aware of them and propose sympathetic measures to support or enhance these without negatively affecting their effectiveness. Suitable mitigation measures in this coastal peninsula include those listed in Table 3.5.

Table 3.5 : Mitigation Considerations – Coastal Peninsula

Flood Source	Likely Mitigation
Tidal	<ul style="list-style-type: none"> • Beach and dune nourishment and maintenance • Raise Fleetwood sea walls to sustain standard of protection over the long term • Capital maintenance works to maintain standard of protection where outer and middle estuary defences are starting to fail or where voiding is present – development contributions will be required from riparian owners • Consider form of development of raise finished floor levels up to the 0.5% AEP (1 in 200year) flood level plus an allowance for climate change and above flood defence breaching or overtopping flood depths • Materials to be flood resilient / resistant to salt water • Avoidance of properties with basements
Fluvial	<ul style="list-style-type: none"> • Apply the sequential approach to site layout avoiding development within the floodplain • Avoid encroachment on or culverting of urban watercourses • Bank and embankment stabilisation works along Royles Brook, Hillylaid Watercourse and Copse Brook Watercourse • Improve existing culvert conditions along Copse Brook Watercourse • Improvements to pumping stations in the medium term • River restoration and continued maintenance of urban watercourses
Surface Water	<ul style="list-style-type: none"> • Implement SuDS to reduce pressure on existing drainage network in line with Lancashire County Council SuDS Guidance • Creation or expansion of wetland areas for flood storage along Springfield Watercourse to reduce pressure on pumping station

3.3 Community Assessment 2: Pilling

3.3.1 Introduction

The section of coast extending between Knott End-on-Sea and Pilling faces north-west and consists of an extensive sandy intertidal zone fronting a narrow strip of saltmarsh on the upper beach, backed by hard linear defences and low-lying land. Inland, this area is largely rural in character with large amounts of open space and contains many international, national and local sites of ecological importance such as Sites of Special Scientific Interest (SSSI), Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Biological Heritage Sites (BHS).

This Community Area includes the rural villages of Pilling, Knott End-on-Sea, Hambleton, Preesall and Stalmine

3.3.2 Flood Risks

Coastal Flooding

The Environment Agency's fluvial Flood Map (Figures 1.1 to 1.7) identifies large parts of this Community Area at risk of tidal flooding from the coast, including the villages of Knott End-on-Sea, Pilling, Preesall and Stalmine. According to the undefended flood depth maps, flood depths are predicted to reach well over 1.25m during the 0.5% AEP (1 in 200-year) tidal event, extending beyond the southern boundary of this community area as floodwater travels south along numerous watercourses and land drainage channels. All sites identified for development in Knott End-on-Sea and Pilling lie within Flood Zone 3. Sites in Stalmine are located outside or on the edge of the Flood Zones. There are sites in Preesall inside and outside of the Flood Zones.

These Flood Zones however represent the undefended scenario. As discussed in Section 1.2.9, this Community Area currently benefits from hard linear defences along the coast, which are designed to protect the area to a 0.5% (1 in 200-year) AEP Standard of Protection (SoP). During the defended scenario, existing defences protect all sites proposed for development from coastal flooding.

Sites in Hambleton are at risk of flooding from rural Ordinary Watercourses. Where a proposed development site is bounded by or contains a watercourse, it will be expected that these are incorporated in the layout of the site without reducing access to the watercourse or detrimentally impacting upon the habitat value of the feature include the functionality of the floodplain. It is recommended that public open space or access roads are positioned adjacent to the watercourse.

When considering the impacts of climate change on sea level rise, housing sites in Knott End-on-Sea, Hambleton, Stalmine and Preesall are at greatest risk with existing defences shown to be overtopped. Assuming existing defences are maintained, sites in Pilling are shown not to be at risk from climate change impacts on sea level rise.

Flooding from Watercourses

Surface water drainage in the villages of Pilling, Preesall and Stalmine and the surrounding rural areas rely on a large network of Ordinary Watercourses and field drains. Many of these watercourses ultimately drain into Main Rivers and eventually into the Wyre estuary to the west or the Irish Sea to the north. Main Rivers include Wheelfoot (Preesall), Grange Pool (Preesall) and Broad Fleet (Pilling) watercourses.

The surrounding low-lying, flat areas are particularly susceptible to both fluvial and surface water flooding during extensive periods of rainfall. The main causes of flooding are shallow hydraulic gradients of receiving watercourses, incapacity in the surface water system, tide locking and lack of maintenance. Issues along these networks can also have knock-on impacts on surface water sewers or highway drainage, which are trying to discharge into these networks.

Development in the area has historically put pressure on these drainage networks and development could play a critical role in ensuring risk is managed and where possible reduced through SuDS techniques, particularly

those sites located along the upstream extents of a number of the smaller Ordinary Watercourses in Knott End-on-Sea, Preesall and Stalmine.

Surface Water Flooding

Surface water flooding includes pluvial (direct rainfall) and sewer flooding. The results of the strategic assessment have been used to define CDAs at the end of this section.

Pluvial Flooding

The uFMfSW (Figures 2.1 to 2.7) shows that the areas at risk of pluvial flooding lie to the west of the Community Area, between the villages of Hambleton and Preesall. According to this dataset, the risk of pluvial flooding to the proposed development sites in and around Pilling is low. According to the Council, areas surrounding Smallwood Hey Road and St.Johns Avenue are also known to flood frequently during heavy rainfall, which is attributed to the local surface water system unable to cope with the amount of runoff entering the system.

During the 3.33% AEP (1 in 30-year) rainfall event, the uFMfSW shows that the highest risk areas are located along rural Ordinary Watercourses that capture runoff and convey water from east to west to the Wyre estuary. Areas of ponding are also observed in localised depressions on agricultural land. Existing highways and structures such as highway culverts along the A588 are also known to restrict this movement of water towards accessible discharge locations.

According to the uFMfSW, there are a limited number of proposed development sites at risk of pluvial flooding. However, the sites identified for development in this Community Area are primarily located on open undeveloped land and currently contribute to the surface water catchment downstream. If surface water runoff is uncontrolled, development could significantly increase flood risk downstream. However, carefully planned and managed development could play a key role in improving existing infrastructure and reducing flood risk downstream.

One of the main issues in this area will be the ability to drain existing development and land. In the short term, rising beach levels will make this increasingly difficult. This will be compounded by these areas not being an Environment Agency / Government priority under current funding arrangements.

Sewer Flooding

The 2015 Level 1 SFRA identifies the areas of Hambleton, Knott End-on-Sea, Pilling and Stalmine as suffering historically from sewer flooding. This is predominantly caused by the flat topography in the area, which gives rise to low hydraulic gradients (some of these networks are pumped) and prevents the surface sewer network from being able to effectively discharge into the receiving watercourses.

It is also believed that the lack of surface water sewers and the volume of surface water runoff entering the combined sewer system amplify the risk of these systems being overwhelmed. This is particularly an issue along the sewer network in Hambleton. The Council have also reported issues with a tidal flap at Wardleys Creek, which allows tidal water to back up through the local surface water system and flooding kiln Lane and Sherbourne Road.

Critical Drainage Areas

Areas at significant risk of flooding from surface water sources including pluvial (direct rainfall), Ordinary Watercourses and sewer flooding, have been defined as CDAs. Table 3.6 describes the CDAs identified in the Hambleton – Pilling Community Area.

Table 3.6 : CDAs – Hambleton, Knott End-on-Sea, Pilling, Preesall and Stalmine

CDA	Reasoning
Hambleton	<p>Hambleton (including Carr Lane between Hambleton and Stalmine) has a history of surface water flooding during periods of heavy rainfall. The main cause of flooding here is the amount of surface water entering the local drainage network (including Ordinary Watercourses, highway drainage and combined sewers), local network restrictions and the interactions these have with Main Rivers, which prevent the drainage systems from being able to effectively discharge due to tide-locking convictions.</p> <p>In this area, there are a number of large-scale developments proposed on previously undeveloped sites. If surface water is not effectively managed, development could further exacerbate existing flood risk issues to areas already at risk. Sustainable drainage techniques will need to be considered to ensure surface water is controlled at source and not transferred downstream with the aim of reducing pressure on the existing drainage network. Drainage capacity improvements and the removal of network restrictions (e.g. enlargement of surface water culverts underneath the highway) will also need to be considered to support large-scale development and ensure effective links between the development site and discharge locations.</p> <p>On previously developed land, a reduction of 50% on existing runoff rates will be sought. Developments must drain on a separate sewerage system, with only foul drainage connected into the foul sewerage network.</p>

Groundwater

The Environment Agency's CFMP¹⁴ identifies a risk of localised groundwater ponding in the Knott End-on-Sea area, which has been attributed to low-lying land and the presence of shallow sand and gravel aquifers.

The ASStGWf flood map (Level 1 SFRA Figure 9-3) shows that the probability of groundwater flooding is high in the south and lower in the north and west of the Community Area. Specifically, the risk of groundwater flooding is very high in Hambleton and Stalmine. These villages contain several proposed development sites primarily identified for housing in East and Southeast Hambleton, Moor End and at several locations along Carr End Lane.

The probability of future groundwater flooding tends to be lower in the centre and northwest of the Community Area, where a significant proportion of potential development sites are located. It should be noted, however that there could be local-scale features in these locations influencing the risk of groundwater flooding that the national-scale dataset cannot accurately determine.

Canal Flooding

Given the geographical distance of the nearest canal (Lancaster Canal) to this Community Area, the risk of flooding from this source to the area is extremely low and it will not be a development constraint in this area.

Reservoir Flooding

The Environment Agency's Risk of Flooding from Reservoirs flood map shows that the whole of the Community Area, including all 59 potential development sites, lie outside of the predicted extent of reservoir flooding. This includes any large reservoirs located outside of the study area that could potentially pose a risk of flooding. There are a number of large water bodies in and around Preesall, but these do not look to be raised above the ground surface or dammed. The residual risk of flooding from these bodies of water will be low.

3.3.3 Flood Risk Management

Existing Infrastructure

Whilst the Environment Agency Flood Zone Map identifies large parts of the Community Area at risk, as mentioned above, the area benefits from defences. These defences, which include grassed earth embankment

¹⁴ Environment Agency (2009) Wyre Catchment Flood Management Plan

with rock armour fronting, run from Knott End-on-Sea to Pilling Marsh and provide a 0.5% (1 in 200-year) AEP SoP.

According to the Shoreline Management Plan (SMP2)¹⁵, these defences have a remaining life greater than 5 years, with most in good condition or showing signs of wear. These embankments, banks, seawalls and revetments are currently maintained by the Environment Agency, Lancashire County Council or privately.

Figures 3.1 to 3.7 contains mapping illustrating the location of the existing coastal flood defence assets, areas currently protected and residual flood depths during the 0.5% AEP (1 in 200-year) tidal event. These maps show that large areas of the Community Area are not at direct risk of coastal flooding. These maps also illustrate the long-term risks associated with defence overtopping should the predicted impacts of climate change on tidal levels occur.

Figures 6.1 to 6.7 contain model outputs illustrating the impacts of breaches along key flood defences assets. Any breaching along the embankments will mostly affect marshland and fields, although proposed development sites in Pilling will be at risk, with flood depths reaching up to 1m along Broad Fleet Main River during the 0.5% AEP (1 in 200-year) tidal event. Breaching along the concrete sea wall at Knott End-on-Sea is likely to result in a similar flood extent to the undefended scenario due to the ground levels behind the defences, with flood depths reaching approximately 0.35m.

Planned Infrastructure Investment

According to the SMP2, the long-term coastal defence strategy from Knott End-on-Sea to Pilling is to continue providing protection against flood and erosion to property and infrastructure (i.e. hold the line). The implementation of the coastal strategy is likely to mean that proposed development sites adjacent to the existing urban areas of Knott End-on-Sea and Pilling will remain protected in the short to medium-term.

However, as with other locations along the SMP2 frontage, it is going to become increasingly difficult to justify the long-term affordability of the maintenance and improvements to current defences that would be required to continue to hold the line. The SMP2 reiterates that there remains a need to consider alternative options for managing the existing defences along this frontage into the medium-term, whether or not the primary defence is realigned.

The Wyre CFMP classifies the fluvial flood risk areas as low to moderate, where the Environment Agency can generally reduce existing flood management actions. This includes a reduction in existing maintenance activities, where this does not have an adverse effect on flood risk to property, thereby reducing expenditure where there are few or no properties at risk. Undeveloped sites identified for development could therefore see fluvial flood risk levels increase as the Environment Agency reduce their flood management actions. This could have secondary impacts on the sites around Hambleton, Pilling, Preesall and Stalmine, which could also see an increase in surface water flooding.

Therefore, when allocating potential development sites, strategic planners should consider the reduction in maintenance activities and aim to reduce the need to manage flood risk in the future. Planners and developers should also aim to avoid development that encroaches on the natural floodplain, whilst taking into account the impacts of reduced flood risk management and climate change over the long-term. If development is required future maintenance and investment will need to be secured through a levy or other means, to ensure long term sustainability. The sequential approach to site layout should be applied as discussed below

3.3.4 Planning Consideration

Based upon the level of risk presented in this SFRA, existing flood risk levels are unlikely to be a significant issue in this area. However, flood risk will be a material planning consideration, especially when considering the potential impacts that the development could have on surface water flooding, potential changes in existing flood management regimes and infrastructure improvement needs.

¹⁵ North West & North West Wales Coastal Group (2011) North West England & North West Wales Shoreline Management Plan SMP2

The Sequential Test

In the first instance, the Council should apply the Sequential Test to all proposed development sites to confirm there are no suitable alternatives on land with a lower probability of flooding. This SFRA recommends that the Council apply the Sequential Test to the whole of the borough..

Table 3.7 outlines the number of proposed housing, employment and mixed-use development sites in the Community Area in relation to Flood Zone 2 and 3. According to Table 3.7, there are 59 sites proposed in the Community Area; 68% are located in Flood Zone 3. This equates to approximately 179.1 hectares of proposed development sites at risk of either fluvial or tidal flooding.

If the Council applied the Sequential Test in its simplest form and avoided allocating development in medium to high flood risk areas altogether, 19 development sites at low risk of flooding within Flood Zone 1 would remain. These will include larger sites around Stalmine and Hambleton, which would see the majority of development. However, applying this strict approach to flood risk avoidance could affect the growth needs for this Community Area, especially coastal villages such as Knott End-on-Sea and Pilling that lie completely within Flood Zone 3, and the Council's wider development aspirations for the borough.

Table 3.7 : Proposed Development Sites at Risk – Hambleton, Knott End-on-Sea, Pilling, Preesall and Stalmine

Development Type	Community Area		Flood Zone 2		Flood Zone 3		Benefitting from Defences	
	Number	Hectares	Number	Hectares	Number	Hectares	Number	Hectares
Housing	51	88.8	0	0.0	33	54.2	31	52.8
Employment	1	0.7	0	0.0	1	0.7	1	0.7
Mixed Use	7	136.8	0	0.0	6	124.3	6	124.3
Total	59	226.3	0	0.0	40	179.1	38	177.8

The Exception Test

If, following application of the Sequential Test, it is not possible to meet local and regional housing needs within those 19 sites already identified in Flood Zone 1 in this area, the Council should consider allocating housing development in the remaining 40 sites in Flood Zone 3. In these instances, the Exception Test will be applicable.

It is likely that development in Knott End-on-Sea and Pilling will provide wider sustainability benefits to the existing community that outweigh flood risk and therefore meet the first criteria of the Exception Test. Before allocating the sites for development, at the strategic planning stage the Council should consider whether the site would meet the second criteria of the Exception Test; would the development will be safe for its lifetime, without increasing flood risk elsewhere and where possible reduce flood risk overall?

Without a site-specific FRA, it would not be possible to truly state whether the site will meet this criterion. However, there should be enough information contained in this SFRA to assess the likelihood of this being achieved before the site is allocated.

The key to understanding this is the appreciation of actual and residual flood risks (i.e. with flood defences in place), and how the existing community will be safe guarded against tidal flooding from the coast over the long-term. For example, Table 3.7 outlines the number of development sites within Flood Zone 3, but also those benefitting from defences. This table shows that out of the 33 housing developments in Flood Zone 3 (and requiring the Exception Test); existing defences currently protect 31 up to a 0.5% AEP (1 in 200-year) SoP. This significantly alters actual flood risk levels in these areas.

Within this Community Area, this SFRA recommends that the Council consider the following issues outlined in Table 3.8 prior to the allocation of development sites in medium to high-risk areas (Flood Zone 2 and 3).

Table 3.8 : Flood Risk Considerations – Hambleton, Knott End-on-Sea, Pilling, Preesall and Stalmine

Flood Risk Considerations	Comments
Are there other sources of risk present?	Yes, the surrounding low-lying, flat areas are particularly susceptible to surface water flooding during extensive periods of rainfall. The main causes of flooding are shallow hydraulic gradients of receiving watercourses, incapacity in the surface water system, tide locking and lack of maintenance. Issues along these networks can also have knock-on impacts on surface water sewers or highway drainage, which are trying to discharge into these networks.
Is the site currently protected and to what standard?	Yes, coastal defences currently protect the majority of sites up to a 0.5% AEP (1 in 200-year) SoP. The Environment Agency Flood Warning service also covers areas at risk.
Is there a significant probability of assets breaching or overtopping?	The risk of existing defences overtopping or breaching is low. However, should a breach to occur along the coastal defences, the extent of flooding could be significant in Pilling. There is also a residual risk in Pilling and Hambleton should flapped outfalls become tide locked or stuck open.
Could climate change impacts increase the risk of these assets overtopping?	The risk of coastal flooding is likely to increase in the future with several coastal defences overtopping due to the impacts of climate change on tidal levels. Areas at highest risk include Knott End-on-Sea, Preesall and Stalmine. Pilling is not particularly sensitive to the impacts of climate change on coastal flooding.
Is there a long-term flood management strategy in place?	The SMP2 short to medium-term strategy continue to provide protection against flood and erosion to property and infrastructure (i.e. hold the line). However, this could change over the long-term due to infrastructure and maintenance investment needs and funding shortfalls. The Environment Agency will also be looking to reduce existing flood management actions along Main Rivers. Therefore, strategic planning decisions should aim to reduce the need to manage flood risk in future.
Are there opportunities for new development to support this strategy or reduce the cause and impact of flooding?	Yes, development proposed on previously undeveloped land should look to implement measures to reduce pressure on existing surface water drainage networks. This will include the sequential approach to site layout, SuDS, the maintenance of Ordinary Watercourses and infrastructure improvements. Sites in Knott End-on-Sea and Pilling could also contribute to the maintenance of and any future upgrades to the coastal defences.

3.3.5 Flood Risk Assessments

For those sites allocated for development in a flood risk area, a detailed site-specific Flood Risk Assessment will be required to accompany any individual site planning proposals. The level of FRA will be dependent on the nature of flood risk present as presented in Table 3.9.

Table 3.9 : Flood Risk Assessment Requirements – Hambleton, Knott End-on-Sea, Pilling, Preesall and Stalmine

Flood Zone	Local Considerations
Flood Zone 1	A Level 1 FRA is required for all sites greater than 1ha in area, but should focus on the identification of 'other' sources of flooding using information contained in this SFRA and historical flood records.
Critical Drainage Area (in addition to any Flood Zone specific requirements)	Developers should undertake at least a Level 2 FRA for all sites due to the high risk of surface water flooding. FRA should assess risk from pluvial, urban watercourses, and sewer flooding. SuDS should be a high priority to reduce pressure on the existing drainage system as well as blue / green infrastructure along watercourses. All development proposed in these areas need to consider cumulative impacts and holistic surface water drainage requirements. Where proposed sites rely on strategic drainage needs, the Council will require evidence that adequate surface water drainage is in place before development proceeds.
Flood Zone 2/3a Undefended Areas	A detailed Level 3 FRA will be required to assess risk from all sources, but particular focus should be on fluvial and tidal sources. In currently undefended areas, the impact of development elsewhere will be of concern and mitigation will be required to offset any impacts.
Flood Zone 3b	All development in Flood Zone 3b should be avoided. Where only part of the site is within Flood Zone 3b, it is recommended a detailed Level 3 FRA is undertaken. The primary flood management approach should be the sequential approach to site layout. The removal of any functional floodplain would be prohibited.
Areas Benefitting	A detailed Level 3 FRA should be undertaken for all sites located in areas currently benefitting from defences.

Flood Zone	Local Considerations
from Defences	Defended fluvial and tidal flood depths and extents provided in this SFRA should be used to assess actual risk to the site. Where a site is already benefitting from defences, residual flood risks should be addressed including risk of defence breaching, overtopping, or of pump failure. Existing hydraulic models are already available from the Environment Agency to undertake this assessment. However, climate change scenarios will have to be updated in line with current guidance.

3.3.6 Flood Risk Management Measures

FRA should consider appropriate mitigation measures given the source and level of flood risk, existing assets and in accordance with the Council's Flood Risk Policy, the Wyre Land Drainage Strategy, the Wyre CFMP and the SMP2.

Whilst new development should not be reliant on existing assets being maintained by others or on the actions of the strategy to be implemented, those carrying out FRAs should be aware of them and propose sympathetic measures to support or enhance these without negatively affecting their effectiveness. Suitable mitigation measures in this coastal peninsula include those listed in Table 3.10.

Table 3.10 : Mitigation Considerations – Hambleton, Knott End-on-Sea, Pilling, Preesall and Stalmine

Flood Source	Likely Mitigation
Tidal	<ul style="list-style-type: none"> Apply the sequential approach to site layout avoiding development within the floodplain Beach nourishment and maintenance in line with SMP2 Capital maintenance works to maintain standard of protection where defences are showing signs of work required in line with SMP2 Consider form of development such as raising finished floor levels up to the 0.5% AEP (1 in 200year) flood level plus an allowance for climate change and above flood defence breaching or overtopping flood depths Materials to be flood resilient / resistant to salt water Avoidance of properties with basements
Fluvial	<ul style="list-style-type: none"> Apply the sequential approach to site layout avoiding development within the floodplain Avoid encroachment on or culverting of urban watercourses Increase culvert capacities where this will not increase downstream flood risk River restoration and opening of culverted sections of watercourse Inspection and maintenance regime for the Ordinary Watercourses, field drainage and outlet flaps Consider the need for pump discharge and on-line storage from the area as sea levels rise and prevent gravity discharge
Surface Water	<ul style="list-style-type: none"> Implement SuDS to reduce pressure on existing drainage network in line with Lancashire County Council SuDS Guidance Creation or expansion of wetland areas for flood storage on a strategic level, which would benefit multiple existing and new developments

3.4 Community Assessment 3: Great Eccleston, Inskip and St. Michaels

3.4.1 Introduction

This Community Area is located in the south of the borough, to the east of Poulton-Le-Fylde and comprises the settlements of Great Eccleston, Inskip and St. Michael's. At present, the majority of potential future development sites proposed in this area are for housing, with some still to be determined and the Nightjar development site proposed for employment.

3.4.2 Flood Risks

Coastal Flooding

The boundary of this Community Area runs along Cartford Bridge, which according to the Environment Agency River Wyre SFRM report¹⁶ is the normal tidal limit for the River Wyre. However, the SFRA also states that the flat topography allows tidal influences to impact throughout the area, and further than the defined tidal limits.

Fluvial/Urban Watercourses

The Environment Agency's Flood Zones 3 and 2 mapping (Figures 1.1 to 1.7) identifies the eastern edge of Great Eccleston, the south eastern tip of Inskip and the majority of St. Michael's as at risk from fluvial flooding from the River Wyre. The two Flood Zone extents are extremely similar throughout the Community Area. The Environment Agency's Wyre CFMP¹⁷ describes the River Wyre within the Lower Wyre sub-area as confined to a narrow, embanked channel, resulting in the loss of natural floodplain. Development has taken place historically within the floodplain; however, further loss of functional floodplain due to development should be avoided.

Mapping indicating the expected undefended flood extents of a 1% AEP (1 in 100-year) fluvial event and 1% AEP event plus 20% climate change case can be found in Figures 3.1 to 3.7. The undefended 1% event extents indicate that in the Great Eccleston area, only the Raikes Brook Farm development site would become inundated with up to approximately 1m floodwater predicted. All but the Garstang Road development site at St. Michael's would have areas that also become inundated up to similar depths. The majority of the development sites near Inskip would not be greatly affected by this event; however, the School Lane site is estimated to suffer depths greater than 1.25m. The Higham Side Road development site is also expected to suffer flooding of depths up to 1.25m depth.

The same fluvial flood events were modelled with the existing defences built into the model. The conditions can be observed in the mapping within Figures 4.1 to 4.7. The Raikes Brook Farm development site shown to be at risk in the undefended case is shown to only be at risk from flooding from the climate change flood extent in the defended case. The same applies for the development sites near St. Michael's. The two development sites near Inskip indicated as at risk in the undefended case are shown to be at risk of fluvial flooding in the defended case, however estimated flood depths are reduced to less than 1.25m.

The CFMP includes a climate change allowance of a 20% increase in peak flow in all watercourses, increasing the probability of large-scale flood events. The Environment Agency estimate that by 2100, flooding will become more frequent and modelling of climate change flooding indicates flood depths are expected to increase by 0.3m in the St. Michael's area in the 1% AEP (1 in 100-year) event.

Existing information suggest that the defences are sufficient to withstand the 1% AEP (1 in 100-year) event. However, these defences would be overtopped in the 1% AEP event plus 20% climate change allowance event. New climate change allowance guidance published in February 2016 by the Environment Agency indicates 20% is outdated and an uplift factor of between 20% and 70% should be used in the North West depending on the whole lifespan of the development.

¹⁶ Environment Agency (2014) River Wyre Strategic Flood Risk Mapping

¹⁷ Environment Agency (2009) Wyre Catchment Flood Management Plan

There is however a significant residual risk of embankment failure, as seen in the December 2015 floods (see Section 3.4.3)

Surface Water Flooding

Surface water flooding includes pluvial (direct rainfall) and sewer flooding. The results of the strategic assessment have been used to define CDAs at the end of this section.

Pluvial Flooding

Pluvial flooding occurs when a rainfall event causes existing drainage to exceed capacity or smaller watercourses unable to discharge into the River Wyre when it is in flood. The uFMfSW (Figures 2.1 to 2.7) shows that the risk of pluvial flooding is spread across the Community Area. According to the dataset, the areas most greatly affected during the 1% AEP (1 in 100-year) event are:

- South and east of Great Eccleston;
- The land south of the A586;
- The junction connecting Brock Road and Hornby Lane; and
- The land on the Community Area boundary west of Watery Gate Farm.

None of the potential development sites within the Community Area are located in areas identified as having major surface water flow paths through them for the 1% AEP (1 in 100-year) event. However, localised flooding can be observed due to natural depressions in topography.

During the extreme 0.1% AEP (1 in 1,000-year) event, the extents of the main surface water flow paths within the Community Area increase significantly in places. The majority of the surface water flood extents are still located outside the areas of potential development. However, the surface water flooding shown to the east of Inskip can be seen to enter the eastern edge of the School Lane development site.

Sewer Flooding

The 2015 Level 1 SFRA states limited flood risk exists from sewer systems in the Central Wyre Area (St. Michael's and Great Eccleston). The latest flood risk assessment of the potential development areas near Great Eccleston classify the risk of sewer flooding as low. Modelling undertaken by United Utilities confirms that public sewers in the Great Eccleston, St Michaels and Churchtown areas would have been able to cope with recent rainfall events (e.g. December 2015), if outfalls had a free discharge and the overland infiltration of the watercourse into the sewers did not occur. Little data was made available on the risk of sewer flooding to other areas in this Community Area.

Critical Drainage Areas

Critical drainage areas can be identified by locating areas of surface water flooding to properties within Flood Zone 1. No CDAs have been defined within this Community Area as part of this assessment process. However, it has been noted that Carr Green Common, Inskip is an important local drainage feature.

Groundwater

The Environment Agency's CFMP does not consider groundwater flooding to be a significant issue across this Community Area due to its underlying geology and the lack of historical flooding incidents from this source.

The AStGWF flood map (Level 1 SFRA Figure 9-3) shows the majority of the Community Area, and potential developments, as being situated within a location where 75% or more of the area could be susceptible or is at risk of groundwater flooding. Specific locations within the Community Area have been classified as having a lower risk to groundwater flooding.

The development sites to the south and west of Great Ecclestone are located in an area of which 25% to 50% of the land is at risk of groundwater flooding. The developments near St. Michael's on Wyre are located in an area of which 50% to 75% of the land is at risk of groundwater flooding. The remaining potential development sites are located in areas of which 75% or more of the land is at risk of flooding due to groundwater.

Canal Flooding

Given that the nearest canal (Lancaster Canal) is approximately 3km from this Community Area, the risk of flooding from this source to the area is low and it will not be a development constraint in this area.

Reservoir Flooding

The Environment Agency's reservoir flood map shows that the potential Raikes Brook Farm development site at the eastern edge of Great Ecclestone and two of the four potential developments at St. Michael's are within the predicted flood extent of Garstang and Catterall Flood Storages and other large reservoirs in the area upstream of Garstang. The remaining potential development sites are located outside the Environment Agency reservoir flood map extents.

3.4.3 Flood Risk Management

Existing Infrastructure

Parts of the fluvial floodplain along the River Wyre through Great Ecclestone, Inskip and St Michael's currently benefit from a network of existing flood defence assets. Figures 3.1 to 3.7 contains mapping illustrating the location of the existing assets along the Main Rivers and Ordinary Watercourses, areas currently protected by these defences and residual flood depths during the 1% AEP (1 in 100-year) fluvial event. Many of the development sites are located within the areas protected by defences.

The Council's Land Drainage Strategy (LDS) (2004)¹⁸ describes the existing standards of service of the Main River systems as lying between 3.33% AEP (1 in 30-year) and 2% AEP (1 in 50-year) standard of protection. The CFMP reinforces this description by stating the majority of the catchment has existing defences that protect property and agricultural land to a standard of protection between 3.33% AEP (1 in 30-year) and 2% AEP (1 in 50-year).

Many of the defences were built to protect farmland with low consequential risk and although the heights may be sufficient to withstand a large flood event, they are inherently unstable. As seen during the December 2015 flood event in St. Michael's, a breach on an embankment along the River Brock occurred, resulting in flooding to approximately 30 properties and the A586 being closed for a number of days. Following the initial event, a major pumping operation took up to a week to clear the water out of the area.

Planned Infrastructure Investment

The CFMP Lower Wyre area covers the majority of the Community Area. The policy outlines essential actions to be undertaken to ensure the aim of the policy is achieved, these are:

- Continue with existing maintenance regime in the short term;
- Follow a risk based expenditure assessment for all measures;
- Improvement of assets to an appropriate standard where they fail to meet target conditions;
- Investigation of flood storage opportunities, setting back of existing embankments and land management changes to sustain current flood risk in the medium to long term;
- Maintenance of existing defences and major assets to their current standard; and
- Undertake a study to improve understanding of interaction between river flow and tide, and consequently the impact on flood risk within the sub area.

¹⁸ Wyre Borough Council (2014) Wyre Borough Council Land Drainage Strategy

Completion of these policies will not hinder the development of any of the potential development sites within the Community Area. However, since the FWMA in 2010, the Council is no longer responsible for maintaining Ordinary Watercourses other than those where the Council is riparian owner. LCC, as LLFA, has powers to issue consents for altering, removing or replacing certain structures or features on ordinary watercourses, but is unlikely maintain these features.

Delivering some of these actions such as maintenance will be the responsibility of riparian owners. There is a risk that related culverts, pumping stations and screens are unmaintained along these Ordinary Watercourses, which could increase the risk of local flooding.

3.4.4 Planning Consideration

Several of the potential development areas within the Community Area benefit from fluvial flood defences, which provide flood protection as well as their own residual flood risk. It is important to consider flood risk when assessing the viability of the potential developments within the Community Area, as flood risk is often a constraint to development within an area. The effects of climate change are likely to increase flood risk to the proposed development sites within this Community Area.

The Sequential Test

In the first instance, the council should apply the Sequential Test to all proposed development in this Community Area to confirm there are no suitable alternatives on land with a lower probability of flooding. It is recommended that the Sequential Test is applied to the whole of the borough..

Table 3.11 outlines the number of proposed housing, employment and mixed-use development sites in this Community Area in relation to the two main fluvial and tidal Flood Zones.

According to Table 3.11, there are 20 sites proposed in this Community Area; 50% are located in Flood Zone 3 and a further 20% in Flood Zone 2. This equates to approximately 73.7 hectares of proposed development sites at risk of either fluvial or tidal flooding.

Table 3.11 : Proposed Development Sites at Risk - Great Eccleston, Inskip and St. Michael's

Development Type	Community Area		Flood Zone 2		Flood Zone 3		Benefitting from Defences	
	Number	Hectares	Number	Hectares	Number	Hectares	Number	Hectares
Housing	17	92.1	3	7.1	9	51.5	6	30.4
Employment	1	8.8	0	0.0	1	8.8	0	0.0
Mixed Use	2	16.2	1	6.3	0	0.0	0	0.0
Total	20	1	4	13.4	10	60.3	6	30.4

If the Council applied the Sequential Test and avoided allocating development in medium to high flood risk areas altogether, only six development sites at low risk of flooding within Flood Zone 1 would remain. Applying this strict approach to flood risk avoidance could affect the growth needs for this Community Area and the Council's wider development aspirations for the borough.

Strategically, the Council should focus housing development where flood risk is at its lowest, outside of the floodplain. The site currently identified for employment (Less Vulnerable) will be suitable for development. It would not be suitable for housing development, without further consideration of actual flood risk levels. Whilst the Exception Test will not be applicable for employment sites, this SFRA recommends that the Council still consider whether the site could remain safe over its lifetime and this includes the points raised below.

The Exception Test

If, following application of the Sequential Test, it is not possible to meet housing needs within those ten sites identified for housing in Flood Zone 1 and Flood Zone 2; the Council should consider allocating housing development in the remaining sites in Flood Zone 3. In these instances, the Exception Test will be applicable.

Before allocating the sites for development, the Council should consider whether the site would meet the second criteria of the Exception Test; would the development will be safe for its lifetime, without increasing flood risk elsewhere and where possible reduce flood risk overall? Without a site-specific Flood Risk Assessment, it would not be possible to truly state whether the site will meet this criterion. However, there should be enough information contained in this SFRA to assess the likelihood of this being achieved before the site is allocated.

The key to understanding this is the appreciation of actual and residual flood risks (i.e. with flood defences in place), and how the existing community will be safe guarded against flooding from the River Wyre over the long-term. For example, Table 3.11 outlines the number of development sites within Flood Zone 3, but also those benefitting from defences. This table shows that out of the nine housing developments in Flood Zone 3 (and requiring the Exception Test); existing defences currently protect six sites. Within this Community Area, this SFRA recommends that the Council consider the following issues outlined in Table 3.12 prior to the allocation of development sites in medium to high-risk areas.

Table 3.12 : Flood Risk Considerations - Great Eccleston, Inskip and St. Michael's

Flood Risk Considerations	Comments
Are there other sources of risk present?	Yes, area is at risk of surface water flooding from tidal, pluvial and Ordinary Watercourses. Uncontrolled development in these areas could place further pressure on the existing drainage network.
Is the site currently protected and to what standard?	Yes, existing flood defences protect large parts of the Community Area up to varying standards of protection.
Is there a significant probability of assets breaching or overtopping?	Yes, the constant degradation of the existing defences results in a residual overtopping or breach risk within the Community Area.
Could climate change impacts increase the risk of these assets overtopping?	Yes, the risk of flooding is likely to increase over time as the standard of protection offered declines and increased rainfall exacerbates the onset of flooding.
Is there a long-term flood risk management strategy in place?	Yes, the Wyre CFMP identifies the long-term FRM policy in this area is to maintain, upgrade or replace of existing defences. This is in addition to investigating further opportunities for flood storage, setting back of embankments and land management. Another aim is to undertake sufficient study to improve understanding of interaction between river flow and tide and therefore the impact on flood risk in the area.
Are there opportunities for new development to support this strategy or reduce the cause and impact of flooding?	Yes, proposed development in this Community Area could have a major role to play in reducing existing flood risks. This could include implementing short-term measures or encouraging sustainable drainage systems into all new developments in line with the NPPF. The possibilities of upstream attenuation should also be investigated.

3.4.5 Flood Risk Assessments

For those sites allocated for development in flood risk areas, detailed site-specific FRAs will be required to accompany any individual site planning proposals. The level of FRA will be dependent on the nature of flood risk present as presented in Table 3.13.

Table 3.13 : Flood Risk Assessment Requirements - Great Ecclestone, Inskip and St. Michael's

Flood Zone	Local Considerations
Flood Zone 1	A Level 1 FRA is required for all sites greater than 1ha in area, but should focus on the identification of 'other' sources of flooding using information contained in this SFRA and historical flood records.
Critical Drainage Area	No Critical Drainage Areas have been defined within this Community Area.
Flood Zone 2/3a Undefended Areas	A detailed Level 3 FRA will be required to assess risk from all sources, but particular focus should be on fluvial and tidal sources. In currently undefended areas, the impact of development elsewhere will be of concern and mitigation will be required to offset any impacts.
Flood Zone 3b	All development in Flood Zone 3b should be avoided all together. Where only part of the site is within Flood Zone 3b, it is recommended a detailed Level 3 FRA is undertaken. The primary flood risk management approach should be the sequential approach to site layout. The removal of any functional floodplain would be prohibited.
Areas Benefitting from Defences	A detailed Level 3 FRA should be undertaken for all sites located in areas currently benefitting from defences. Defended fluvial and tidal flood depths and extents provided in this SFRA should be used to assess actual risk to the site. Where site is already benefitting from defences, residual flood risks should be addressed including risk of defence breaching and overtopping. Existing hydraulic models are already available from the Environment Agency to undertake this assessment. However, climate change scenarios will have to be updated in line with current guidance.

3.4.6 Flood Risk Management Measures

FRAs should consider appropriate mitigation measures given the source and level of flood risk, existing assets and in accordance with the Council's Flood Risk Policy, the Wyre Land Drainage Strategy and the Wyre CFMP.

Whilst new development should not be reliant on existing assets being maintained by others or on the actions of the strategy to be implemented, those carrying out FRAs should be aware of them and propose sympathetic measures to support or enhance these without negatively affecting their effectiveness. Suitable mitigation measures in this Community Area include those listed in Table 3.14.

Table 3.14 : Mitigation Considerations - Great Ecclestone, Inskip and St. Michael's

Flood Source	Likely Mitigation
Fluvial	<ul style="list-style-type: none"> Apply the sequential approach to site layout avoiding development within the floodplain Avoid encroachment on or culverting of Ordinary Watercourses Bank and embankment stabilisation works Investigate opportunity for implementation of flood storage, setting back of embankments and land management Maintain existing defence maintenance schedule and standards of protection Mitigation measures to be encouraged through all proposed developments Regular culvert maintenance to reduce risk of blockage River restoration and continued maintenance of urban watercourses
Surface Water	<ul style="list-style-type: none"> Creation or expansion of upstream catchment areas for flood storage Implement SuDS to reduce pressure on existing drainage network in line with Lancashire County Council SuDS Guidance

3.5 Community Assessment 4: M6 Corridor

3.5.1 Introduction

The M6 corridor Community Area is located to the east of the borough, transecting the borough from the village of Forton in the north to Barton in the south. The area is parallel to the M6 and encompasses the market town of Garstang. The Lancaster Canal runs through the area parallel to the M6 for much of the Community Area's length.

The majority of potential future development sites are identified for future housing, however there are also potential large mixed-use developments located on the western edge of Garstang, at the village of Winmarleigh and to the east of the railway at Bilsborrow. Another proposed development site (approximately 70 hectares) shows the potential 'expansion' of Bilsborrow near Myerscough College.

3.5.2 Flood Risks

Coastal Flooding

The Environment Agency's Flood Zones 2 and 3 (Figures 1.1 to 1.7) identify small, localised areas at risk of coastal flooding should flood defences be overtopped or a storm surge / inundation propagate upstream. The two locations are in the upper reaches of the Lee Brook to the west of Garstang and the River Cocker and Park Lane Brook to the south-west of Forton. None of the proposed development sites are at risk of coastal flooding.

Fluvial Flooding

The principal watercourses running through this Community Area include the River Wyre, River Calder, River Brock and the Bacchus Brook, which rise in the fells to the east of the borough. Generally, the majority of existing development is within Flood Zone 1 with only isolated properties located within Flood Zones 2 or 3. There are a number of buildings at Myerscough College to the west of Bilsborrow, which are located within Flood Zone 3. The Six Arches caravan park to the north-west of Scorton is located within Flood Zone 3b.

The edge of existing development on the eastern boundary of Garstang closely follows the extent of Flood Zones 2 and 3, suggesting that development has been well controlled historically. Although a small number of buildings are located within protected Flood Zone 3, major development has not encroached upon the Wyre floodplain. Existing development has also been constrained by the Wyre Flood Alleviation Scheme (FAS), Garstang flood attenuation area to the east of the town.

Four potential development sites to the west of Catterall (on the northern bank of the River Wyre), the West Scorton development site, one site south of Garstang and a number of sites north of Bilsborrow are at risk of flooding from a 1% AEP (1 in 100-year) fluvial event. The undefended (worst case) 1% AEP (1 in 100-year) flood depths are shown in Figures 3.1 to 3.7 along with the climate change extents. The four potential development sites are at risk of flooding of up to 1m. In this area, for the undefended case, the extents for the 1% AEP (1 in 100-year) and the 1% AEP (1 in 100-year) plus climate change scenarios are similar.

Surface Water Flooding

Surface water flooding includes pluvial (direct rainfall) and sewer flooding. The results of the strategic assessment have been used to define CDAs at the end of this section.

Pluvial Flooding

Pluvial flooding occurs when a rainfall event causes existing drainage to exceed capacity. Parts of Scorton are at risk of flooding as defined by the Environment Agency's uMfSW; the Park Brook flows through the village to the confluence with the River Wyre and is predicted to overtop the Station Lane Bridge for the 3.33% AEP (1 in 30-year) event.

Parts of Garstang are predicted to be at risk of urbanised flooding from overland flow paths based on the uFMfSW. The mapping identifies a flow path to the south of Croston Road and flooding to the west of the A6 on the western boundary of the town. There is also flooding predicted at the junction of Green Lane West and Lancaster Road (B6430) in Garstang.

There is flooding predicted based on the uFMfSW in Catterall, but it is not attributed to a particular watercourse and appears to be overland flow. Properties are predicted to be at risk on Baylton Drive and Cock Robin Lane from the 3.33% AEP (1 in 30-year) event.

Sewer Flooding

The risk of sewer flooding in this Community Area is believed to be low, with little evidence of historical flooding. The 2015 Level 1 SFRA also states that there is limited flood risk from the sewer system in this area.

Critical Drainage Areas

Table 3.15 describes the CDAs identified in the M6 Corridor Community Area. There are a number of surface water flooding locations predicted by the uFMfSW across the Community Area; however, these are primarily located in rural areas and do not affect existing property.

Table 3.15 : CDAs - M6 Corridor

CDA	Reasoning
Garstang	The uFMfSW predicts an overland flow path through the west of Garstang, which broadly matches two reports of historic surface water flooding. The source of flooding appears to be a combination of rural runoff from the west, which is predicted to pond to the west of the A6, but also downstream (east) of the A6 in the residential roads north of the Lancaster canal. The predicted flow path ends at Moss Lane.
Catterall	The uFMfSW predicts runoff from the rural areas to the south-west that could affect properties between Cock Robin lane and Joe Lane. The risk of flooding is likely to be at greatest risk during winter and spring when the grounds infiltration capacity is at its lowest. The water treatment works, approximately 0.5km west of Catterall is also predicted to be at risk from surface water flooding.
Bilsborrow	While Bilsborrow is predominantly at risk of fluvial flooding from the River Wyre, there are also extensive areas of predicted surface water flood risk based on the extent of the uFMfSW. Overland flow paths are predicted to converge on the centre of the village on the A6. The runoff appears to be the result of exceedance of the infiltration capacity of rural areas to the east of the village. The excessive runoff entering the sewers increases the strain placed on the urban surface water drainage network. Fluvial flooding is also predicted which is likely to exacerbate surface water flooding as it has the potential to limit the outflow of the drainage network to the River Brock, although the timing of the two events may not coincide, reducing the risk.

Groundwater

The Environment Agency’s CFMP does not consider groundwater flooding to be a significant issue within the Wyre catchment, consequently due to its underlying geology and the lack of historical flooding incidents the M6 Corridor Community Area is considered to have a low risk of groundwater flooding. The AStGWF map (Level 1 SFRA Figure 9-3) concurs with this assessment placing the majority of the Community Area in the lowest risk group for groundwater flooding. There are areas of higher risk to the north and east of the Community Area, with the eastern area broadly following the route of the M6.

The risk of groundwater flooding to future development is likely to be lower as the majority of the potential development sites are located in the areas of lowest risk. The assessment is based on a national dataset and developments will need to make use of local data, at the site-specific FRA stage, to refine this assessment to take account of local-scale features that could influence the risk of groundwater flooding. Five potential development sites are located in areas with between 50% to 75% of the land susceptible to groundwater flooding. These are; the three sites adjoining Factory Brow, Scorton, West Scorton and the Myerscough College site, west of Bilsborrow.

Canal Flooding

The Lancaster Canal passes through this Community Area broadly on a north-south axis, skirting the southern boundary of Garstang. The canal is predominantly at surrounding ground level with one section of raised embankment identified approximately 1.3km to the west of Garstang. The embankment is on the western side of the canal and therefore if it should fail it could affect nearby Nateby Hall but no potential development sites would be at immediate risk. Floodwater would follow the natural topography of the Lee Brook, which flows westwards and then northwards. Historic information provided by the Canal and Rivers Trust indicates that a canal breach occurred at this location in December 1936. The Canal and River Trust website has reports indicating that the canal may have overtopped in winter 2015 due to surface water inflows.

Reservoir Flooding

The Environment Agency's reservoir flood risk map indicates an extensive area at risk of reservoir flooding to the north and east of Garstang. The source of this risk is the Grizedale, Grizedale Lea and Barnacre reservoirs approximately 4km to the north-east of Garstang; water supply reservoirs operated by United Utilities. Following the area of risk immediately downstream of the reservoirs flood flows would follow the natural topography of the Grizedale Brook and other Ordinary Watercourses further south from the Barnacre reservoir.

West of the M6 this area of risk combines with that originating from the Wyresdale Lake although the extent of flood risk does not extend into the developed area of Garstang. The area of risk then follows the river Wyre valley with a broadly similar extent as that of the fluvial flood zones.

Several potential development sites to the south east of Garstang lie within the area classified as at risk of reservoir flooding; as does the West Scorton site. The Environment Agency's reservoir flood risk map does not take into account the risk of failure of smaller reservoirs (less than 25,000m³ in volume), which could add further risk of flooding from such structures not currently mapped. There are no known small reservoirs in this community area.

3.5.3 Flood Risk Management

Existing Infrastructure

The majority of this Community Area is rural in nature. According to Environment Agency's data, there are flood defences along the River Wyre to the north of Garstang and a flood defence running along the southern (left) bank of the River Calder protecting Catterall. There are also flood defences recorded on the Environment Agency database on the Ains Pool and River Brock, which appear to be defending farmland.

This Community Area also benefits from two FSAs: the Garstang flood basin to the east of Garstang and the Catterall flood basin to the south-west of Catterall, both of which were constructed in the 1980's as part of the Wyre FAS. The Environment Agency's CFMP makes reference to a narrow but embanked channel in this area and that erosion has been known to damage raised defences.

Planned Infrastructure Investment

According to the Wyre CFMP, the Environment Agency are already managing the risk of flood effectively through the Garstang and Catterall FSAs, but they may need to take further actions to maintain existing levels of flood risk. The primary risk to the operation of the scheme are the predicted impacts of climate change. The Environment Agency are currently investigating then sites along the length of the River Wyre where it may be possible to allow natural flooding to occur.

Paragraph 100 of the NPPF¹⁹ states that local authorities should identify areas of land that can be safeguarded from development; enabling the reservation of flexibility to increase standards of protection for future flood management if and when it is required. Areas that flood as a result of fluvial and non-fluvial flooding should be

¹⁹ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf (March 2012)

considered, where appropriate. As part of any site-specific FRAs for potential development, liaison with the Council and Environment Agency should be undertaken to assess whether the potential development site encroaches upon these areas safeguarded for future flood management. This should focus on areas identified within the existing undefended and defended fluvial flood zones extents.

Figures 3.1 to 3.7 contains mapping illustrating the location of the existing assets, areas currently protected and residual flood depths during the 1% AEP (1 in 100-year) fluvial and the 0.5% AEP (1 in 200-year) tidal events.

The provision of flood defences does appear to prevent flooding to land that may be deemed appropriate for development. Therefore, it is important when considering appropriate locations for future development that the 'undefended' development scenario is taken into account, which assumes that the flood defences do not exist. This is particularly relevant given that climate change may reduce the standard of protection provided by existing defences.

3.5.4 Planning Consideration

Flood risk will be a major development consideration in this area as discussed in Section 3.5.2. The primary risk will be from the River Wyre but also from local surface water sources as identified in Section 3.5.3. Garstang and Catterall both benefit from the FSAs constructed as part of the Wyre FAS in the 1980's. These FSA also benefit Churchtown, St Michaels and Great Eccleston downstream. Given the potential impact of climate change, and if not considered strategically or managed on a site-specific basis, future development in this area has the potential to be both susceptible to flooding as well as adversely impacting existing flood risk areas.

The Sequential Test

In the first instance, the council should apply the Sequential Test to all proposed development in the M6 Corridor to confirm there are no suitable alternatives on land with a lower probability of flooding. It is recommended that the Sequential Test is applied to the whole of the borough..

Table 3.16 outlines the number of proposed housing, employment and mixed-use development sites in this Community Area in relation to the two main fluvial Flood Zones. According to Table 3.16, there are 86 sites proposed in this Community Area; 27% are located in Flood Zone 3 and a further 8% in Flood Zone 2. This equates to approximately 232 hectares of proposed development sites at risk of fluvial flooding.

Table 3.16 : Proposed Development Sites at Risk - M6 Corridor

Development Type	Community Area		Flood Zone 2		Flood Zone 3		Benefitting from Defences	
	Number	Hectares	Number	Hectares	Number	Hectares	Number	Hectares
Housing	66	203.0	7	12.2	17	62.6	5	22.7
Employment	3	44.7	0	0.0	2	43.3	0	0.0
Mixed Use	17	340.4	0	0.0	4	114.0	0	0.0
Total	86	588.1	7	12.2	23	219.9	5	22.7

If the Council applied the Sequential Test and avoided allocating development in medium to high flood risk areas altogether, 56 (65%) potential development sites at low risk of flooding within Flood Zone 1 would remain. Applying this strict approach to flood risk avoidance could affect the growth needs for this Community Area and the Council's wider development aspirations for the borough. Within this particular Community Area, it may also be difficult to substitute More Vulnerable development into areas of lower risk, as two of the three sites earmarked for employment are already located in Flood Zone 3.

Strategically, housing (More Vulnerable) development proposed for the west of Catterall should be avoided as it is located within Flood Zone 3 of the River Wyre. The Sequential Test should be used to determine which of the alternative sites further south, within Flood Zone 1, are deliverable. Continuing with the current proposals would require the development to pass the Exception Test.

The majority of the development proposed as part of the western expansion of Garstang is appropriate from a flood risk perspective as it is located within Flood Zone 1 and away from the floodplain of the River Wyre, which is to the east of the town. Housing development proposed for Scorton may not be appropriate, as it is located partly within Flood Zone 3.

The potential expansion of Bilsborrow to Myerscough College to the west may not be appropriate, as the existing site is located partially within Flood Zone 3. The expansion should be designed to ensure it does not increase flood risk for other parties.

The Exception Test

If, following application of the Sequential Test, it is not possible to meet housing needs within those 42 sites identified for housing in Flood Zones 1, the Council should consider allocating housing development in the remaining seven sites in Flood Zone 2 and then the 17 in Flood Zone 3. In these instances, the Exception Test will be applicable.

Before allocating the sites for development, at the strategic planning stage the Council should consider whether the site would meet the second criteria of the Exception Test; would the development will be safe for its lifetime, without increasing flood risk elsewhere and where possible reduce flood risk overall? A flood risk assessment for each specific development site will be required to demonstrate compliance with these requirements of the Test. It is intended that this SFRA will provide sufficient information to inform the FRA and therefore whether the development meets this requirement.

The key to understanding this is the appreciation of actual and residual flood risks (i.e. with flood defences in place), and how the existing community will be protected against flooding from the River Wyre and other watercourses over the long-term. For example, Table 3.16 outlines the number of potential development sites within Flood Zone 3, but also those benefitting from defences. This table shows that of the seventeen residential developments situated within Flood Zone 3 (and requiring application of the Exception Test); existing flood defences currently protect five up to a 1% AEP (1 in 100-year) fluvial event. This significantly alters the understanding of flood risk in these development areas.

Within this Community Area, this SFRA recommends that the Council consider the following issues outlined in Table 3.17 prior to the allocation of potential development sites in medium to high-risk areas.

Table 3.17: Flood Risk Considerations - M6 Corridor

Flood Risk Considerations	Comments
Are there other sources of risk present?	Yes, area is at risk of surface water flooding from pluvial, urban watercourses and sewer sources and reservoir flooding. Uncontrolled development in these areas could place further pressure of the existing drainage network or place new development at increased risk of flooding.
Is the site currently protected and to what standard?	The 2004 WBC Drainage Strategy refers to the Standard of Protection on Main Rivers as typically between 3.33% AEP (1 in 30-year) and 2% AEP (1 in 50-years). Given the extent s of Flood Zone 3b on the River Wyre the river is predicted to flood from a 5% AEP (1 in 20-year) _event.
Is there a significant probability of assets breaching or overtopping?	The River Wyre has extensive areas of Flood Zone 3b along its reach. Overtopping of the existing defences is likely to occur somewhere along the reach on average of once every twenty years. Risk of reservoir flooding due to a breach is considered to be low due to the inspection regime required under the Reservoirs Act, 1975.
Could climate change impacts increase the risk of these assets overtopping?	The latest guidance from the Environment Agency (February 2016) indicates that peak flows and rainfall intensities are predicted to increase over the next century due to the impact of climate change. This is likely to increase the frequency of predicted flood events, i.e. Flood Zone 3 based on the 1% AEP (1 in 100-year) flood extent is likely over time to flood more frequently. While new flood defences will be expected to account for the predicted impact of climate change older ones such as the Wyre FAS may not and consequently their Standard of Protection may fall without intervention. The areas benefitting from existing defences should not be assumed to be protected to the same standard for the whole lifetime of development.

Flood Risk Considerations	Comments
Is there a long-term flood risk management strategy in place?	Wyre BC developed a Land Drainage Strategy in 2004, which is broadly in line with the policy recommendations of both the Wyre CFMP. The CFMP identifies the long-term FRM policy in this Community Area is to sustain the current level of flood risk and to mitigate the impacts of climate change to achieve this while identify and investigate further flood storage and land management opportunities to benefit flood risk in the medium to long term.
Are there opportunities for new development to support this strategy or reduce the cause and impact of flooding?	Yes, proposed develop in this Community Area, specifically those along the Wyre valley at Garstang, could have a major role to play in reducing existing flood risks by providing reductions in existing levels of runoff or via the provision of runoff attenuation storage in accordance with the CFMP. Efforts should be made to locate potential development sites outside of flood extents for the 1% AEP (1 in 100-year) plus climate change scenario where possible.

3.5.5 Flood Risk Assessments

For those sites allocated for development in flood risk area, a detailed site-specific FRA will be required to accompany any individual site planning proposals. The level of FRA will be dependent on the nature of flood risk present as presented in Table 3.18.

Table 3.18: Flood Risk Assessment Requirements - M6 Corridor

Flood Zone	Local Considerations
Flood Zone 1	A Level 1 FRA is required for all sites greater than 1ha in area, but should focus on the identification of 'other' sources of flooding using information contained in this SFRA and historical flood records.
Critical Drainage Area	Developers should undertake at least a Level 2 FRA for all sites in Garstang, Catterall and Bilsborrow due to the high risk of surface water flooding. FRA should assess risk from pluvial, urban watercourses, and sewer flooding. SuDS should be a high priority to reduce pressure on existing drainage system as well as blue / green infrastructure along urban watercourses.
Flood Zone 2/3a Undefended Areas	A detailed Level 3 FRA will be required to assess risk from all sources, but particular focus should be on fluvial sources. In currently undefended areas, the impact of development elsewhere will be of concern and mitigation will be required to offset any impacts.
Flood Zone 3b	All development in Flood Zone 3b should be avoided completely. Where only part of the site is within Flood Zone 3b, it is recommended a detailed Level 3 FRA is undertaken. The primary flood risk management approach should be the sequential approach to site layout. The removal of any functional floodplain would be prohibited.
Areas Benefitting from Defences	A detailed Level 3 FRA should be undertaken for all sites located in areas currently benefitting from defences. Defended fluvial and tidal flood depths and extents provided in this SFRA should be used to assess actual risk to the site. Where a site is already benefitting from defences, residual flood risks should be address including risk of defence breaching, overtopping, of pump failure and the impact of climate change. Existing hydraulic models are already available from the Environment Agency to undertake this assessment. However, climate change scenarios will have to be updated in line with current guidance.

3.5.6 Flood Risk Management Measures

FRAs should consider appropriate mitigation measures given the source and level of flood risk, existing assets and in accordance with the Council's Flood Risk Policy, the Wyre Land Drainage Strategy and the Wyre CFMP.

Whilst new development should not be reliant on existing assets being maintained by others or on the actions of the strategy to be implemented, those carrying out FRAs should be aware of them and propose sympathetic measures to support or enhance these without negatively affecting their effectiveness. Suitable mitigation measures in this Community Area include those listed in Table 3.19.

Table 3.19: Mitigation Considerations - M6 Corridor

Flood Source	Likely Mitigation
Fluvial	<ul style="list-style-type: none"> • Apply the sequential approach to site layout avoiding development within the floodplain • Avoid encroachment on or culverting of urban watercourses • Maintain existing Standards of Protection of the Wyre FAS • River restoration of and continued maintenance of urban watercourses • Additional flood storage areas/attenuation • Natural flood management
Surface Water	<ul style="list-style-type: none"> • Implement SuDS to reduce pressure on existing drainage network in line with Lancashire County Council SuDS Guidance • Mitigation schemes with measures such as attenuation storage in rural areas or additional drainage capacity

4. Flood Risk Policy

4.1 National Planning Policy

National planning policy is set out in the NPPF, which was published by the Government in March 2012. It forms a more succinct replacement for numerous topic-specific Planning Policy Statements (PPSs), including PPS25 on flood risk. The NPPF is accompanied by online NPPG²⁰, first published in March 2014, which provides further guidance on specific issues, including flood risk, and replaces all previously published national planning guidance.

The NPPF covers a full range of planning issues drawing on the central issue of sustainable development. Central themes include the re-use of previously developed land of low environmental value, promoting economic growth and high quality design, and transitioning to a low carbon future, including taking full account of flood risk.

The NPPF underpins the process by which local planning authorities are to account for flood risk as an integral part of the planning process. The overarching aims set out by the NPPF for the management of flood risk at a planning authority level are encapsulated in Paragraph 100 of the document:

“Local Plans should apply a sequential, risk-based approach to the location of development to avoid where possible flood risk to people and property and manage any residual risk, taking account of the impacts of climate change, by:

- *applying the Sequential Test;*
- *if necessary, applying the Exception Test;*
- *safeguarding land from development that is required for current and future flood management;*
- *using opportunities offered by new development to reduce the causes and impacts of flooding; and*
- *where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long-term, seeking opportunities to facilitate the relocation of development, including housing, to more sustainable locations.”*

These aims effectively set the scope for the specific outcomes of the SFRA process. The SFRA in turn then informs planning and development management decisions to ensure that the aims can be achieved.

The NPPF states that ‘a sustainability appraisal which meets the requirements of the European Directive on strategic environmental assessment should be an integral part of the plan preparation process, and should consider all the likely significant effects on the environment, economic and social factors’ (paragraph 165). The purpose of Sustainability Appraisal is to promote sustainable development through better integration of sustainability considerations in the preparation and adoption of plans. The Sustainability Appraisal developed in conjunction with the Local Plan will be informed by the information and recommendations contained in this updated SFRA.

It is important to reiterate that the NPPF covers a range of planning issues – not just flood risk. The formulation of Council policy and the allocation of land for future development must also meet the requirements of other elements of the NPPF, including (for example) with regard to environmental protection, housing and economic growth. The provision of sustainable development requires the balancing of a range of social, economic and environmental factors.

The SFRA aims to assist in this process through the provision of a clear and robust evidence base upon which informed decisions can be made.

²⁰ <http://planningguidance.communities.gov.uk/>

4.1.1 The Sequential Test

The NPPF includes the Sequential Test, aiming to ensure that new development is steered away from the area of highest flood risk: Flood Zone 3 progressing towards the lowest designation: Flood Zone 1. The Sequential Test takes into account the vulnerability to flooding of the development and stipulates what is appropriate in each flood risk zone. Table 2 of the NPPG classifies the vulnerability to flooding of types of development and Table 3 classifies whether the development is appropriate for each Flood Zone or whether the Exception Test needs to be applied for the development to progress.

The Level 1 SFRA provides the necessary evidence to apply the Sequential Test. The SFRA also provides mapping identifying areas at risk of other sources of flooding. These should also be considered during the application of the Sequential Test, specifically surface water flooding which is a high risk source of flooding in the borough.

4.1.2 The Exception Test

The consideration of future regeneration and development within the borough could result in the consideration of sites that cannot pass the Sequential Test and therefore require the assessment of the Exception Test. If a development is proposed that is not 'appropriate' as defined in Table 3 of the NPPG, the Exception Test is a method to demonstrate and help ensure that flood risk to people and property would be managed satisfactorily, whilst allowing certain types of necessary development to progress ahead in situations where suitable sites at lower risk of flooding are not available.

For the Exception Test to be passed:

- g) *"it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared; and*
- h) *a site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall."*

Local Sustainability

In order to demonstrate compliance with the first requirement, the development would need to be assessed by the applicant against the Local Plan's Sustainability Appraisal. It is the intention of this Level 2 SFRA to provide the information necessary to apply the Exception Test for the site-specific FRA to address the second point.

Site Specific Flood Risk Assessment

The requirement for a FRA is summarised in footnote 20 of the NPPF:

"A site-specific flood risk assessment 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."

In addition, the Council requires the completion and submission in support of a planning application for sites in Flood Zone 1 that are within a CDA (see Section 0). The evidence provided in the Level 1 SFRA and this Level 2 SFRA helps identify those development sites that will require the application of the Exception Test.

4.1.3 Windfall Sites

Windfall Sites are sites that become available for development unexpectedly and are therefore not included as allocated land in a planning authority's development plan. Should a site become available that is not located within one of the development sites, the Sequential Test should be applied on an individual site basis and the

developer will need to provide evidence to the Council that they have adequately considered other reasonably available sites.

The following steps should be followed for windfall sites:

- To complete the Sequential Test, identify which Flood Zone the site is located within using the Environment Agency Flood Zone Map and the flood maps provided in this SFRA;
- Where sites fall partially in Flood Zone 2 and/or Flood Zone 3, the “more vulnerable” element of the development (i.e. dwellings) should be located in Flood Zone 1;
- Confirm if the site is located within a CDA; and
- Follow the site-specific FRA guidance in paragraph 30 of the NPPG.

4.2 Local Planning Policy

4.2.1 Role of the SFRA

The important role of the SFRA in the local plan process is set out in the NPPF, which states:

“Local planning authorities should use the Assessment to:

- *Determine the variations in risk from all sources of flooding across their areas, and also the risks to and from surrounding areas in the same flood catchment;*
- *Inform the sustainability appraisal of the Local Plan, so that flood risk is fully taken into account when considering allocation options and in the preparation of plan policies, including policies for flood risk management to ensure that flood risk is not increased;*
- *Apply the Sequential Test and, where necessary, the Exception Test when determining land use allocations;*
- *Identify the requirements for site-specific flood risk assessments in particular locations, including those at risk from sources other than river and sea flooding;*
- *Determine the acceptability of flood risk in relation to emergency planning capability;*
- *Consider opportunities to reduce flood risk to existing communities and developments through better management of surface water, provision for conveyance and of storage for flood water”.*

The ideal solution to effective and sustainable flood risk management is a planning led one, i.e. steer development away from areas that are susceptible to flooding. The NPPF stipulates the application of a sequential approach to site allocation – seeking development sites within areas of lowest flood risk in the first instance (Flood Zone 1 – low probability of flooding). Only if it can be demonstrated that there are no suitable sites within these areas should alternative sites (i.e. within areas that may potentially be at greater risk of flooding – Zones 2 (medium probability), 3a (high probability) or 3b (functional floodplain)) be contemplated, taking account of the vulnerability of the proposed land use.

The Sequential Test, which is set out in the NPPF with further detail provided in the NPPG, must be utilised in both allocating sites and determining applications. Tables 1 to 3 in the NPPG stipulate ‘appropriate’ land uses for each Flood Zone. Land uses are divided into five ‘vulnerability classifications’, detailed in Table 2 of the NPPG:

- Essential Infrastructure;
- Highly vulnerable;
- More vulnerable;
- Less vulnerable; and
- Water-compatible development.

Table 3 of the NPPG identifies types of development (by vulnerability classification) that should not be permitted in particular Flood Zones. It also identifies circumstances in which the 'Exception Text' must be passed for development not initially permissible in that zone, where, following application of the Sequential Test, no sites are available in zones with lower flood risk.

Paragraph 102 of the NPPF states that; *'For the Exception Test to be passed: it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh the flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared; and a site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.'*

The latter point includes a requirement to take account of the future risk from climate change over the lifetime of the development.

The Level 1 SFRA produced by the Council in 2015, provides the information necessary to delineate flood zones across the borough in order to apply the Sequential Test. The Council is currently reviewing their development proposals in order to determine the allocation sites to be developed therefore while the Exception Test may not need to be applied to every case however this Level 2 provides additional information pertinent to the specific allocation sites in order to:

- Determine the degree of flood risk for each potential allocation site to apply the Exception Test; and
- Provide the information to ensure that development is appropriate based upon its vulnerability classification.

5. Sustainable Flood Risk Management

5.1 Overview

The role of the flood RMA is provided in the Level 1 SFRA. This section provides an overview of the Council's planning requirements for the consideration of flood risk and development to ensure that flood risk is managed in a sustainable manner into the future.

The risk of flooding can never be completely eliminated, but the likelihood and consequences of flooding can be minimised through good management. One of the key aims of the Environment Agency's National Flood and Coastal Erosion Risk Management Strategy and the Lancashire and Blackpool Flood Risk Management Strategy²¹ is to improve flood risk management in a sustainable way. In other words, the risk of flooding must be reduced now, but in a way, which does not compromise the interconnected needs of the economy, society and environment in the future. Indeed, one of the defined roles of local authorities in the Flood & Water Management Act 2010 is for them to aim to contribute towards the achievement of sustainable development.

The primary purpose of the SFRA is to inform decision making as part of planning policy and development management processes, taking due consideration of the scale and nature of flood risk affecting the borough. Responsibility for flood risk management resides with all tiers of government, and indeed individual landowners and applicants.

5.2 Spatial Planning

5.2.1 Emerging Local Plan

This SFRA is part of the evidence base supporting the new Local Plan currently being developed. The new plan will set out a vision for growth and development for the borough to 2031, including where new homes, employment and shops will be located and which areas will be protected. At present, the intention is to submit the Plan for examination by the Planning Inspectorate in early 2017.

5.2.2 Site Allocations

The ideal solution to effective and sustainable flood risk management is a planning led one, i.e. steer development towards the areas of lowest flood risk (Flood Zone 1). The NPPF stipulates the application of a sequential approach to site allocation – seeking development sites within areas of lowest flood risk in the first instance (Flood Zone 1). Only if it can be demonstrated that there are no suitable sites within these areas should alternative sites (i.e. within areas that may potentially be at greater risk of flooding) be contemplated (seeking sites in Flood Zone 2 and then, failing that sites in Flood Zone 3), taking account of the vulnerability of the proposed land use.

At present, the final schedule of sites to be included in the Local Plan has yet to be determined therefore this SFRA considers all potential sites. The Sequential Test, which is set out in the NPPF with further detail provided in the accompanying NPPG must be applied when seeking to allocate sites. Tables 2 and 3 in the NPPG stipulate 'appropriate' land uses for each Flood Zone.

Table 3 identifies types of development that should not be permitted in particular Flood Zones via the application of the Sequential Test; it also identifies types of development which may be permitted in zones of higher flood risk where, following the application of the Sequential Test, it is not possible to locate the development within zones with a lower probability of flooding. Table 3 also specifies instances where, having undertaken the Sequential Test, the Exception Test is required.

²¹ Lancashire Local Flood Risk Management Strategy, Blackpool Council and Lancashire County Council, 2013

Paragraph 102 of the NPPF states that *'For the Exception Test to be passed:*

- *It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh the flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared; and*
- *A site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.'*

The latter point includes a requirement for account to be taken to the future risk from climate change over the lifetime of the development.

The Planning Practice Guidance (SFRA guidance, paragraph 012) states that *'where a Level 1 Assessment shows that land outside flood risk areas cannot appropriately accommodate all the necessary development, it may be necessary to increase the scope of the Assessment to a Level 2 to provide the information necessary for application of the Exception Test where appropriate.'*

RECOMMENDATION:

Any future site allocations must be determined via the application of the Sequential Test, and the Exception Test if required. The evaluation of potential sites should be guided by the mapping and the findings presented within the Level 1 and this Level 2 SFRA, including with regard to CDAs. Full account should be taken of all sources of flooding including from rivers, groundwater, sewerage and surface water, together with the potential effects of climate change on flood risk and impacts on and from existing flood management infrastructure.

5.3 Planning Advice

Planning applications can be submitted both for sites allocated within development plans and other sites, known as windfall sites. Flood risk at windfall sites may not have been previously considered in detail by the local planning authority.

The NPPF²² stipulates that a site-specific flood risk assessment is required for:

- *'Development proposals on sites of 1 hectare or greater in Flood Zone 1;*
- *All proposals for new development (including minor development and change of use) in an area within Flood Zone 1 which has critical drainage problems (as notified to the local planning authority by the Environment Agency);*
- *All proposals for new development (including minor development and change of use) in Flood Zones 2, 3a and 3b; and*
- *Where proposed development or a change of use to a more vulnerable class may be subject to other sources of flooding (groundwater or surface water flooding).'*

Table 5.1 is an extract from the detailed summary table included in Appendix A and indicates the Council's requirements for site-specific FRA in support of planning applications.

²² National Planning Policy Framework, Department for Communities and Local Government, March 2012

Table 5.1: Summary of Flood Risk Assessment Requirements

Zone 3b Functional Floodplain		Zone 3a High Probability	Zone 2 Medium Probability	Critical Drainage Areas	Zone 1 Low Probability
Existing Development	New Development				
Detailed FRA required				FRA required (proportionate to level of risk), should focus on records of past flooding and SuDS	FRA required (proportionate to level of risk) for all sites greater than 1ha in area, but should focus on records of past flooding and SuDS. Recommend that sites of 1ha or less carry out an assessment of localised flood risks

The site-specific FRA must follow the Sequential Test, and if required the Exception Test, as noted above and detailed in the NPPF and the accompanying NPPG. The NPPF stipulates that the FRA must demonstrate that:

- The development is appropriate in its proposed location, considering the proposed use and all potential sources of flooding;
- Within the site, the most vulnerable development is located in areas of lowest flood risk unless there are overriding reasons to prefer a different location;
- The development is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed, including by emergency planning; and it gives priority to the use of sustainable drainage systems; and
- The development will not increase flood risk elsewhere.

Paragraph 104 of the NPPF notes the following exceptions to this:

- The Sequential Test need not be applied where the proposed site is allocated in the development plan; and
- The Sequential and Exception Tests should not be applied for applications for minor development and changes of use, 'except for any proposal involving a change of use to a caravan, camping or chalet site, or to a mobile home or park home site, where the Sequential and Exception Tests should be applied as appropriate'.

The NPPF requirements are supplemented by local planning policies in relation to flooding set out in local planning documents produced by the Council as indicated in Section 6 of the Level 1 SFRA.

The Environment Agency offers a free and charged for planning advice service. They will provide a free preliminary opinion on what environmental constraints, including flood risk, may affect development proposals. They then offer a charged planning advice service for any further discussions about the development proposals. This would include for example, a detailed review of a site specific Flood Risk Assessment. More information on this service can be found online at:

<https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion>

A Site-Specific Flood Risk Assessment Checklist is provided by the Government as part of the Planning Practice Guidance and should be used as the starting point for all site-specific FRAs. It is available online at:

<http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/site-specific-flood-risk-assessment-checklist/>

It is understood that at the present time, the Environment Agency has not notified the Council of any areas within Flood Zone 1 with critical drainage problems at present. However, areas which are likely to be most at risk of flooding from local sources, and where sustainable drainage solutions should be a priority, have been identified in this SFRA and have been delineated as CDAs. Typically, these are areas in Flood Zone 1 that have

been highlighted as at risk of surface water flooding (see Section 5.4.6). Consequently, a FRA would also be required for sites greater than 1ha in area within Zone 1, but outside an CDA. The FRAs in Zone 1 should be proportionate to the level of risk and focus on records of past flooding and sustainable drainage solutions.

The Environment Agency provides detailed Standing Advice, available online²³, to assist with both those developing and evaluating FRAs. This includes information on what FRAs should cover and what accompanying plans should be submitted. In addition to a Flood Risk Standing Advice Tool for Local Planning Authorities, advice specific to the fluvial flood zone in which the proposed development lies and the broad size of the development is provided. For example, there is specific standing advice for proposed developments in fluvial Flood Zone 1, which are more than 1ha in size or in an area with critical drainage problems. It is also noted that a homeowner's guide to flood resilience has been published at;

<http://www.knowyourfloodrisk.co.uk>

5.4 Flood Risk Management

5.4.1 Building and Development Design

The Environment Agency standing advice of finished floor levels (FFLs) includes recommendations for floor levels for new development; ground floor levels should be a minimum of whichever is higher of:

- a) 300mm above the general ground level of the site; or
- b) 600mm above the estimated river or sea flood level.

For sites, which are located in Flood Zone 3 Tidal Areas Benefitting from Defences (ABD), FFLs may be set to a minimum of 600mm above the surrounding ground level together with the inclusion of flood proofing measures. This should only be where it is not practical to set FFLs in relation to the Environment Agency's standing advice (whichever is higher of 300mm above the general ground level of the site or 600mm above the estimated river or sea flood level). Raising site levels should be kept to a minimum in Flood Zone 3.

If these levels cannot be achieved, extra flood resistance or resilience measures should be considered. Where existing development will be below adjacent new raised development appropriate measures (cut off drains or similar) will be required to prevent run off flooding to existing properties.

5.4.2 Basements

The Environment Agency provides standing advice on FRAs, which states that, an emergency "escape plan needs to be included for any part of a building that is below the estimated flood level." The FRA needs to show that a basement in such a property includes internal access to an upper level e.g. a staircase.

RECOMMENDATION:

Habitable rooms in basement developments should not be permitted within Flood Zones 2 or 3 and the Council should discourage the conversion of existing properties to include a habitable room in such locations. Where this approach conflicts with permitted development, the Council should take the opportunity to explain why this policy has been adopted and the potential dangers of developing a habitable room in such locations should be considered.

5.4.3 Emergency Response

The Council is designated as a Category 1 Responder under the Civil Contingencies Act 2004. As such, the Council has defined responsibilities to assess risk, and respond appropriately in case of an emergency, including (for example) a major flooding event. The Council's primary responsibilities are:

²³ www.gov.uk/planning-applications-assessing-flood-risk

- From time to time assess the risk of an emergency occurring;
- From time to time assess the risk of an emergency making it necessary or expedient for the person or body to perform any of his or its functions;
- Maintain plans for the purpose of ensuring, so far as is reasonably practicable, that if an emergency occurs the person or body is able to continue to perform his or its functions;
- Maintain plans for the purpose of ensuring that if an emergency occurs or is likely to occur the person or body is able to perform his or its functions so far as necessary or desirable for the purpose of:
 - Preventing the emergency;
 - Reducing, controlling or mitigating its effects; or
 - Taking other action in connection with it.

The Environment Agency monitors river and tidal water levels at a number of locations within the borough²⁴. Based upon a sophisticated in-house forecasting computer model, the Environment Agency makes an assessment of the maximum water level that is likely to be reached during an anticipated flood event, which can extend from a few hours to several days. Where these predicted water levels are expected to result in the inundation of populated areas²⁵, the Environment Agency will issue a series of Flood Alerts and Flood Warnings within defined flood warning areas, encouraging residents to take action to avoid damage to property in the first instance.

In addition to the Environment Agency fluvial flood warning service, the Flood Forecasting Centre is a partnership between the Environment Agency and the Meteorological Office. The centre forecasts for all natural forms of flooding - river, surface water and groundwater. A daily Flood Guidance Statement provides information for Category 1 and 2 responders to help with emergency planning and resourcing decisions. It presents an overview of the flood risk across five days and identifies possible severe weather, which could cause flooding and significant disruption to normal life. These forecasts, combined with understanding of the areas at highest risk of local flooding through the borough flood risk maps, can inform emergency planning for all sources of flooding.

As water levels rise and begin to pose a risk to life and/or livelihood, it is the responsibility of the emergency services to coordinate the evacuation of residents. The Council will support this evacuation. It is essential that a robust plan is in place that clearly sets out (as a minimum):

- Roles and responsibilities;
- Paths of communication;
- Evacuation routes;
- Community centres to house evacuated residents; and
- Contingency plans in case of loss of power and/or communication.

Dry access (i.e. above flood level) should be sought wherever possible to ensure that all residents can be safely evacuated in times of flood. A Flood Evacuation Plan must be in place, suitable to the type of development, where there is no safe dry access to/from the site (i.e. access through Zone 1). To inform the assessment of public 'safety'. The flood risk figures provide an indication of the predicted flood depth along key local roads for a range of storm events.

Coordination with the emergency services and the Environment Agency is imperative to ensure the safety of residents in time of flood. Relatively few areas within the borough are at risk of river flooding (as indicated by Figures 1.1 to 1.7).

²⁴ <https://flood-warning-information.service.gov.uk/river-and-sea-levels>

²⁵ Restricted to those urban areas situated within EA flood warning zones

Flooding of this nature will typically occur following relatively long duration rainfall events, and consequently forewarning will generally be provided to encourage preparation in an effort to minimise property damage and risk to life. It is worth highlighting however that the benefits of flood warning are often compromised to a large degree by the lack of 'take up' within the local community. This emphasises the extreme importance of raising local awareness with respect to the potential risks of flooding.

Areas suffering from localised flooding issues may be at greater risk due to the difficulty of forecasting intense rainfall, which may lead to surface water flooding and the response of aquifers to above average long-term rainfall, which may lead to groundwater flooding. Localised flooding caused by intense rainfall can occur rapidly and pose a risk to life, particularly in confined spaces e.g. basement properties. Furthermore, the blockage of gullies and culverts as a result of litter and/or leaves is commonplace, and this will inevitably lead to localised problems that can only realistically be addressed by reactive maintenance.

It is noted, however, that the Environment Agency has recently introduced a Groundwater Flood Warning Service as an extension to its existing Floodline Warnings Direct service. This new service is available to areas, which have previously been affected and already receive local information about groundwater flooding. The service will issue Flood Alerts when there is the possibility of flooding from groundwater, Flood Warnings in some areas when flooding of property is expected and support the dissemination of information through the website, flood wardens, flood action groups etc.

It is recommended that the Council advises the Local Resilience Forum of the risks raised in light of the updated SFRA, ensuring that the planning for future emergency response can be reviewed accordingly. This will inform the Local Resilience Forum Community Risk Register.

5.4.4 Unsuitable Existing Development

Paragraph 100 of the NPPF recommends that, where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long-term, local authorities should seek to facilitate the relocation of development, including housing, to more sustainable locations.

RECOMMENDATION:

The Council, working in partnership with the Environment Agency, Lancashire County Council (as LLFA), and others, should seek to identify both existing development which is potentially at risk from future impacts of climate change and, if necessary, potential sites for relocating that development, taking into account the Sequential Test. More suitable alternative uses for such sites should be sought, taking into account Table 3 in the NPPG. The information contained in the SFRA can be used to assist this process.

5.4.5 Safeguarding

Paragraph 100 of the NPPF states local authorities should safeguard land from development that is required for current and future flood management; such land may take the form of multi-functional water-compatible green infrastructure, which can also be used to provide natural flood storage. Areas that flood as a result of fluvial and non-fluvial flooding should be considered, where appropriate.

RECOMMENDATION:

In partnership with the Environment Agency, Lancashire County Council (as LLFA) and others, the Council should seek to identify land required for current and future flood management and, if justified, safeguard it through planning policy. This can include areas within or adjoining allocated development sites, which are particularly suitable for flood management purposes. The information contained in the SFRA can be used to assist this process.

Where a potential development site is bounded by or contains a Main River watercourse, it will be expected that any developer incorporates it into the layout of their site without reducing access to the watercourse or detrimentally impacting upon the habitat value of the feature. It is recommended that public open space or

access roads are positioned adjacent to the watercourse. It should be noted that an Environmental Permit may be required for certain flood risk activities and a permit would not be forthcoming for inappropriate development. Developers can check the GOV.UK website for further information: <https://www.gov.uk/guidance/flood-risk-activities-environmental-permits>

5.4.6 Critical Drainage Areas

Flooding can occur from non-fluvial, in addition to fluvial, sources. Knowledge of the locations susceptible to non-fluvial sources of flooding can be lost if flooding does not happen for a number of years, but it is important that these areas are identified so that they are retained as natural flood storage where possible and can be taken into account in flood risk assessments. CDAs are identified Section 0.

The NPPF requires a site-specific flood risk assessment for all development proposals “*in an area within Zone 1 which has critical drainage problems (as notified to the local planning authority by the Environment Agency)*”. The Level 1 and Level 2 SFRA has identified areas that are likely to be most at risk of flooding from local sources.

RECOMMENDATION:

The Council should seek to adopt a local policy requiring a site-specific FRAs for all development in CDA to address this anomaly. The CDA are identified in this SFRA. FRAs are particularly important in such areas, as they have known localised flooding problems, which can cause significant damage. CDAs should also be shown on the Proposals Map to highlight these areas, linked to the relevant policy.

Functioning drainage systems, including SuDS, should be a primary focus for any development in CDAs. The Council will require evidence that adequate surface water drainage is in place before development proceeds.

5.4.7 Opportunities to Reduce Flooding

Paragraph 100 of the NPPF recommends that local plans should seek to reduce the causes and impacts of flooding by “*using opportunities offered by new development*”.

The NPPF requires local authorities to work with other local authorities and providers to assess infrastructure needs in their area, including with regard to flood risk (Paragraph 162). After identifying infrastructure needs, the NPPF states that strategic policies should then be included within the Local Plan to deliver the infrastructure required (Paragraph 156). However, with regard to such financial contributions, account should be taken of the potential impact on the financial viability of development proposals, particularly in light of the current challenging economic climate.

RECOMMENDATION:

The Council should:

- Continue to work with other authorities and bodies, as appropriate, to identify specific flood risk infrastructure required within the borough. The information contained in the SFRA can be used to assist this process, although more detailed studies may be required;
- In identifying potential development sites in the emerging Local Plan, seek reasonable opportunities for flood risk reduction measures, where required, and develop site-specific guidance for such sites in the form of policy wording and/or Supplementary Planning Documents where appropriate. This could potentially include statements seeking Section 106 agreements to secure that planning benefit. The information contained in the SFRA can be used to assist this process, although more detailed studies may be required.
- If appropriate, specifically identify sites for future flood risk management infrastructure on the Proposals Map with supporting policy wording in the Local Plan; and
- Consider Community Infrastructure Levy charges, and appropriate policy guidance relating to this, as a potential additional tool for securing contributions towards the delivery of flood risk reduction measures where a need has been identified.

This section is also relevant to any neighbourhood plans developed in the Council.

5.4.8 Planning Applications

Planning applications can be submitted both for sites allocated within development plans and other sites, known as windfall sites. Flood risk at windfall sites may not have been previously considered in detail by the local planning authority. The NPPF stipulates that a site-specific flood risk assessment is required for:

- *'Development proposals on sites of 1 hectare or greater in Flood Zone 1;*
- *All proposals for new development (including minor development and change of use) in an area within Flood Zone 1 which has critical drainage problems (as notified to the local planning authority by the Environment Agency);*
- *All proposals for new development (including minor development and change of use) in Flood Zones 2, 3a and 3b; and*
- *Where proposed development or a change of use to a more vulnerable class may be subject to other sources of flooding (groundwater or surface water flooding).'*

Table 5.1 is an extract from the summary table in Appendix A and summarises the Council's requirements for site-specific FRAs. It is noted that the Environment Agency has not notified the Council of any areas within Flood Zone 1 with critical drainage problems at present. However, areas which are likely to be most at risk of flooding from local sources, and where sustainable drainage solutions should be a priority, have been identified in this SFRA and have been delineated as CDA. Planning applications in these locations will require a site-specific FRA, which should be proportionate to the level of risk and focus on records of past flooding and sustainable drainage solutions.

The Environment Agency provides detailed Standing Advice, available online²⁶, to assist with both those developing and evaluating of flood risk assessments. This includes information on what FRAs should cover and what accompanying plans should be submitted. In addition to a Flood Risk Standing Advice Tool for Local Planning Authorities, advice specific to the fluvial flood zone in which the proposed development lies and the broad size of the development is provided. For example, there is specific standing advice for proposed developments in fluvial Flood Zone 1, which are more than 1ha in size or in an area with critical drainage problems. It is also noted that a homeowner's guide to flood resilience has been published at;

<http://www.knowyourfloodrisk.co.uk>.

5.4.9 Surface Water Flow Paths

New development needs to be appropriate for its locations, based on the intended use and designated flood zone. In addition, the layout of the site should take account of flow paths that transect or intersect the site boundary (see Figures 3.1 to 3.7) ensuring that the development does not impede them or re-direct them to other developed areas.

RECOMMENDATION:

Through planning policy, the Council should encourage developers to take note of surface water flow paths in Flood Zone 1, to ensure the development does not impede or redirect them exacerbating flood risk to the intended users or other development.

²⁶ www.gov.uk/planning-applications-assessing-flood-risk

5.4.10 Surface Water Management Plans

Defra has published guidance on the development of SWMP²⁷. The document provides guidance on the identification of need, approach, risk assessment, option identification and assessment and the development of an action plan for implementation. The full list of CDA identified is included in Table 5.2.

These identify areas in the borough at elevated risk of local flooding but within flood Zone 1. However because they are intended to influence future development or re-development they are not influenced by the presence of existing development.

The purpose of a SWMP is to develop a long-term action plan to manage surface water flood risk, particularly in area of existing development given that it is anticipated the planning system will proactively manage flood risk to new development. Consequently, the CDA identified as part of this SFRA have been reviewed to identify areas of existing development that could benefit from a SWMP as indicated in Table 5.2.

Table 5.2: Review of Critical Drainage Areas

Critical Drainage Area	Flood Risk Summary	Historical Flood Risk
Thornton	Complex drainage interactions, low hydraulic gradients and combined sewer systems result in the drainage and sewerage systems in the area surcharging. Assets are said to have a medium to high flood risk due to failure of nearby pumping stations and partially collapsed sections of watercourse.	According to historical flood risk datasets collected during the preparation of this SFRA, the area of Thornton is at high risk of surface water flooding.
Poulton-le-Fylde	High concentrations of surface water sewers, low hydraulic gradients and tide locking of local culverted watercourses at key outfalls result in the main flooding source in the CDA being surface water.	According to historical flood risk datasets collected during this SFRA, the area of Poulton-le-Fylde is at high risk of surface water flooding.
Hambleton	The predominant source of flooding is surface water, resulting from insufficiently sized drainage, interactions with Main Rivers and tide locking at key outfalls.	Hambleton (including Carr Lane between Hambleton and Stalmine) has a history of surface water flooding during periods of heavy rainfall.
Garstang	The uFMfSW predicts an overland flow path through the west of Garstang.	The flow path broadly matches two reports of historic flooding.
Catterall	Predictive hydraulic modelling indicates a risk of flooding to the south of Cock Robin lane in Catterall	Not verified by historical records.
Bilsborrow	Extensive areas of predicted surface water flood risk based on the extent of the uFMfSW. Overland flow paths are predicted to converge on the centre of the village on the A6	Not verified by historical records.

RECOMMENDATION:

Based on the assessment included in Table 5.2, the Council should give consideration to a brief screening exercise to confirm the risk and history of flooding to these locations and consider the development of SWMPs if a history of flood risk is confirmed.

²⁷ Surface Water Management Plan Technical Guidance, Defra, 2010

6. Recommendations

A number of recommendations are included in Section 5.4 of this SFRA as follows:

- 1) Any future site allocations must be determined via the application of the Sequential Test, and the Exception Test if required. The evaluation of potential sites should be guided by the mapping and the findings presented within the Level 1 and this Level 2 SFRA, including with regard to CDA. Full account should be taken of all sources of flooding including from rivers, groundwater, sewerage and surface water, together with the potential effects of climate change on flood risk and impacts on and from existing flood management infrastructure.
- 2) Habitable rooms in basement developments should not be permitted within Flood Zones 2 or 3 and the conversion of existing properties to include a habitable room in such locations should be discouraged by the Council. Where this approach conflicts with permitted development, the Council should take the opportunity to explain why this policy has been adopted and the potential dangers of developing a habitable room in such locations should be considered.
- 3) The Council, working in partnership with the Environment Agency, Lancashire County Council (as LLFA), and others, should seek to identify both existing development which is potentially at risk from future impacts of climate change and, if necessary, potential sites for relocating that development, taking into account the Sequential Test. More suitable alternative uses for such sites should be sought, taking into account Table 3 in the NPPG. The information contained in the SFRA can be used to assist this process.
- 4) In partnership with the Environment Agency, Lancashire County Council (as LLFA) and others, the Council should seek to identify land required for current and future flood management and, if justified, safeguard it through planning policy. This can include areas within or adjoining allocated development sites, which are particularly suitable for flood management purposes. The information contained in the SFRA can be used to assist this process.
- 5) The Council should seek to adopt a local policy requiring a site-specific flood risk assessment for all development in CDA to address this anomaly. The CDA are identified in this SFRA. FRAs are particularly important in such areas as they have known localised flooding problems which can cause significant damage. CDAs should also be shown on the Proposals Map to highlight these areas, linked to the relevant policy.
- 6) The Council should:
 - a) Continue to work with other authorities and bodies, as appropriate, to identify specific flood risk infrastructure required within the borough. The information contained in the SFRA can be used to assist this process, although more detailed studies may be required;
 - b) In identifying potential development sites in the emerging Local Plan, seek reasonable opportunities for flood risk reduction measures, where required, and develop site-specific guidance for such sites in the form of policy wording and/or Supplementary Planning Documents where appropriate. This could potentially include statements seeking Section 106 agreements to secure that planning benefit. The information contained in the SFRA can be used to assist this process, although more detailed studies may be required.
 - c) If appropriate, specifically identify sites for future flood risk management infrastructure on the Proposals Map with supporting policy wording in the Local Plan; and
 - d) Consider Community Infrastructure Levy charges, and appropriate policy guidance relating to this, as a potential additional tool for securing contributions towards the delivery of flood risk reduction measures where a need has been identified.
- 7) Through planning policy, the Council should encourage developers to take note of surface water flow paths in Flood Zone 1, to ensure the development does not impede or redirect them exacerbating flood risk to the intended users or other development.

- 8) Based on the assessment included in Table 5.2, the Council should give consideration to a brief screening exercise to confirm the risk and history of flooding to these locations and consider the development of SWMPs if a history of flood risk is confirmed.

The table included in Appendix A summarises the recommendations made in this SFRA regarding spatial planning and development management. It is important to note that the table is designed as a summary of issues covered elsewhere in the SFRA, NPPF and other guidance documents. It should not be relied upon in isolation when writing or evaluating a FRA.

6.1 Updating this SFRA

This SFRA provides a strategic overview of the spatial variation of flood risk throughout the borough at a particular point in time, building upon the best available information at that time.

The SFRA has been developed building heavily upon existing knowledge with respect to flood risk within the borough; with data continually changing as new flooding events occur and further modelling is undertaken, this knowledge is continually evolving. In addition, Government policy on flood risk continues to change, with significant changes to national and local policy evident between the publication of the previous SFRA in 2007 and the production of this update in 2015. Given that this is the case, a periodic review of this SFRA is imperative and it must be treated as a living document.

The following key questions should again be addressed as part of the SFRA review process:

Question 1

Has any flooding been observed within the borough since the previous review? If so, the following information should be captured as an addendum to the SFRA:

- Location of flooding (grid reference or street name);
- Date(s) of flooding;
- Source of flooding (e.g. surface water, main river, sewers etc);
- Pathway of floodwaters (e.g. along the particular streets);
- Receptors (e.g. properties flooded internally, road, gardens etc);
- Frequency of flooding (e.g. once a year, during heavy rainfall etc).

Question 2

Have any amendments to the NPPF or the accompanying NPPG or Local Planning been issued since this document was published? If so, does it materially affect any relevant Council policy or the assessment or recommendations of this SFRA?

Question 3

Has the Environment Agency or LCC (as LLFA) issued any amendments to their flood risk mapping and/or guidance since the previous policy review? If so:

- Has any further detailed flood risk mapping been completed within the borough, resulting in a change to the 5% (1 in 20-year) AEP, 1% (1 in 100-year) AEP or 0.1% (1 in 1,000-year) AEP flood outline? If yes, then the Zone 3b and Zone 3a flood outlines should be updated accordingly;
- Has any further detailed or revised mapping been produced for the borough resulting in a change to the identification or extent of CDA? If so, then relevant maps should be altered accordingly;
- Has the assessment of the impacts that climate change may have upon rainfall and/or river flows over time altered? If yes, then a review of the impacts that climate change may have upon the borough is required;

- Do the development management recommendations provided in the SFRA in any way contradict emerging Environment Agency advice with respect to (for example) the provision of emergency access, the setting of floor levels and the integration of sustainable drainage techniques? If yes, then a discussion with the Environment Agency is required to ensure an agreed suite of development control requirements are in place.

It is highlighted that the Environment Agency updates the Flood Map for Planning (Rivers and Sea) on a quarterly basis. If this has been revised within the borough, the updated Flood Zones will be automatically forwarded to the Council for their reference. *It is recommended that only those areas that have been amended by the Environment Agency since the previous SFRA review are reflected in Zone 3 and Zone 2 of the SFRA flood maps.* This ensures that the more rigorous analyses carried out as part of the SFRA process are not inadvertently lost by a simple global replacement of the SFRA flood maps with the Flood Map for Planning (Rivers and Sea).

Question 4

Has the implementation of the SFRA within the spatial planning and/or development management functions of the Council raised any particular issues or concerns that need to be reviewed as part of the SFRA process?

Appendix A. Site-Specific FRA Guidance

Wyre BC SFRA Appendix A - Spatial Planning and Development Management Recommendations

Requirements	NPPF Flood Zone					
	Zone 3b Functional Floodplain		Zone 3a High Probability	Zone 2 Medium Probability	Critical Drainage Areas	Zone 1 Low Probability
	Existing Development ¹	New Development				
DEVELOPMENT MANAGEMENT RECOMMENDATIONS						
Important Considerations	<p>Opportunities should be sought: to reduce overall level of flood risk in the area through layout and form of development and appropriate application of SuDS; and to relocate existing inappropriate development to land with lower probability of flooding. Sequential Test required (unless para.104 of NPPF applies)</p> <p>All existing 'solid buildings' that would otherwise be in Zone 3b, unless designed to allow the passage of water, together with any other land prevented from flooding in a 5% (1 in 20) AEP event by the presence of solid buildings and existing infrastructure, are considered to be within Zone 3a for planning purposes. Existing buildings and other land designed to flood will continue to be in Zone 3b.</p>		<p>Opportunities should be sought: to reduce overall level of flood risk in the area through layout and form of development and appropriate application of SuDS; to relocate existing inappropriate development to land with lower probability of flooding; and to create space for flooding to occur.</p> <p>All existing 'solid buildings' are considered to be within Zone 3a for planning purposes, together with any other land prevented from flooding in a 5% (1 in 20) AEP event by the presence of solid buildings and existing infrastructure, unless designed to allow the passage of water (even if in Zone 3b on flood map). Sequential Test required (unless para.104 of NPPF applies)</p>	<p>Opportunities should be sought to reduce overall level of flood risk in the area through layout and form of development and appropriate application of SuDS.</p> <p>Sequential Test required (unless para.104 of NPPF applies)</p>	<p>Important to check whether site is a 'dry island'.</p> <p>CDAs have been identified which are likely to be most at risk of flooding from local sources. Local flooding must be considered as in integral part of the design process for all development.</p> <p>Opportunities should be sought to reduce overall level of flood risk in the local area through layout and form of development and appropriate application of SuDS. (See guidance provided by EA on Critical Drainage Areas - equally applicable here)</p>	<p>Important to check whether the site is a 'dry island'.</p> <p>It is important to recognise that sites within Zone 1 may be susceptible to flooding from other sources. Development may contribute to an increase in flood risk elsewhere if not carefully mitigated.</p> <p>Opportunities should be sought to reduce overall level of flood risk in the area and beyond through layout and form of development and appropriate application of SuDS.</p>
Appropriate Land Use (refer to Tables 2 and 3 of the NPPG)	Proactively seek a reduction in risk by reducing the vulnerability of the existing land use.	Water Compatible uses Essential Infrastructure, if passes Exception Test.	Water Compatible or Less Vulnerable uses. More Vulnerable uses or Essential Infrastructure, if passes Exception Text.	Water Compatible, More Vulnerable or Less Vulnerable uses. Highly Vulnerable uses, if passes Exception Test.	No restrictions upon land use.	No restrictions upon land use.
SPECIFIC DEVELOPMENT MANAGEMENT RECOMMENDATIONS						
Flood Risk Assessment (FRA) (all sources of flooding)	Detailed FRA required (provided it is appropriate development for Flood Zone 3b)		Detailed FRA required	Detailed FRA required	FRA required (proportionate to level of risk), should focus on records of past flooding and SuDS	FRA required (proportionate to level of risk) for all sites greater than 1ha in area, but should focus on records of past flooding and SuDS. Recommend that sites of 1ha or less carry out an assessment of localised flood risks
Extensions, Outbuildings, Permitted Development & Property Subdivision (see EA guidance on PD on internet)	There should be a presumption against all building extensions (including out-buildings) to avoid raising flood levels elsewhere. Property sub-division may increase the population at risk, and should not be permitted. Restriction of PD rights should be considered.		Building extensions (inc. out-buildings) should be discouraged to avoid raising flood levels elsewhere. Property sub-division may increase intensity of development, and population at risk, and should be discouraged. Restriction of PD rights should be considered.		Building extensions and outbuildings may obstruct overland flow paths and should be designed carefully to avoid raising the potential risk of flooding to adjoining properties. Restriction of PD rights should be considered.	
Flood Resilience & Resistance, including Floor Levels	FRAs must include details of flood resilience and resistance measures included in designs. Generally, floor levels must be a minimum of 300mm above the 1% (1 in 100) AEP river flood level, including climate change, but varies according to flood zone and nature of development – see EA & Lancs CC guidance				FRAs must include details of any flood resilience and resistance measures included in designs (see EA & Lancs CC guidance). No minimum floor level	
Site Access & Escape, including Flood Evacuation	For residential property, dry access is to be provided in the 1% (1 in 100) AEP event. For commercial property, access must be 'safe' in accordance with Defra "Flood Risk to People" (FD2320 & FD2321). A Flood Evacuation Plan must be in place, suitable to the type of development, where there is no safe dry access to/from the site (i.e. access through Zone 1) – officers should consult the WBC Emergency Planning team as appropriate.				FRA should consider the vulnerability of the proposed development, and a safe route of escape should be provided if necessary ² .	
Basements	Seeking to reduce vulnerability of use	Not permitted	Basement dwellings not permitted (see NPPF). For other development, no sleeping accommodation permitted at basement level. All basements must have an access point that is above the 1% (1 in 100) AEP river flood level, including climate change	Exception test required for basement dwellings (see NPPF). Generally, basements to have unimpeded access internally to upper levels – see EA guidance.	No sleeping accommodation permitted at basement level. All basements must have an access point that is above the anticipated localised flood level.	
SuDS & Permeable Paving	Priority must be given to use of SuDS. Implement SuDS to seek runoff from the site (post development) that does not exceed greenfield runoff rates, where feasible. Any SuDS design must take account of groundwater and geological conditions. NB Hardstanding which exceeds 5sqm in front garden of residential properties must be permeable (result of amendment to General Permitted Development Order (GPDO) in 2008)					
Buffer Zones and EA Consent	Minimum 8m buffer zone must be provided to 'top of bank' within sites immediately adjoining a Main River corridor (both open waterways and culverted waterway corridors). Any structures within 8m of 'top of bank' require EA consent. Reference should be made to EA's "Living on the Edge" guide (www.environment-agency.gov.uk) that discusses development situated in, over, under or adjacent to rivers and/or streams and the responsibilities of the riparian landowner.					
Other	Ensure that the proposed development does not result in increase in flood levels elsewhere – e.g. by ensuring that existing impermeable area is not increased, that overland flow routes are not truncated by buildings and/or infrastructure, or hydraulically linked to compensatory flood storage is provided within the site (or upstream) – measures should be appropriate to potential impact.					
	As an integral part of the government's "Making Space for Water" agenda, the EA is actively seeking the denaturalisation of culverted watercourses as part of any future development, and this is acknowledged by WDC. Realistic opportunities to reinstate the natural open waterway within existing culverted reaches of the river(s) should be promoted.					
	Ensure ALL sources of flooding are covered by the FRA and that surface water is adequately managed in line with EA and BCC guidance, especially in known WCDA.					
	In addition to a Flood Risk Assessment, applications within all fluvial flood zones (including within WCDA) for developments of greater than 1ha must be accompanied by proposals for the management of surface water, as per EA standing advice. Hyperlink reference not valid. Similar surface water management proposals should also be prepared for developments of less than 1ha within any flood zone even if an FRA is not required.					

This table is designed as a summary of issues covered elsewhere in the SFRA, NPPF and other guidance documents – it should not be relied upon in isolation when writing or evaluating a FRA

¹ Existing development specifically designed to allow the passage of flood water, such as buildings on stilts or car parks designed to flood

² Local knowledge may suggest that the rapid onset of flooding (from surface water), its long duration (e.g. groundwater flooding) or its large depth could pose a risk to life which should be taken into consideration

Appendix B. Glossary

Adaptation	Adjustments to natural or human systems in response to actual or expected climatic factors or their effects, including from changes in rainfall and rising temperatures, which moderate harm or exploit beneficial opportunities (<i>NPPF definition</i>).
AEP	Annual Exceedance Probability e.g. 1% AEP is equivalent to 1% (1 in 100) probability of flooding occurring in any one year (or, on average, once in every 100 years)
Climate Change	Long-term variations in global temperature and weather patterns caused by natural and human actions.
Core Strategy	Part of the Local Plan for Borough of Wyre, which sets the long-term vision and objectives for the area. It contains a set of strategic policies that are required to deliver the vision including the broad approach to development.
Defra	Department of Environment, Food and Rural Affairs
Development	The carrying out of building, engineering, mining or other operations, in, on, over or under land, or the making of any material change in the use of a building or other land.
Development Plan	This includes adopted Local Plans and neighbourhood plans, and is defined in section 38 of the Planning and Compulsory Purchase Act 2004 (<i>NPPF definition</i>).
Delivery and Site Allocations Plan	A spatial planning document within the Council's Local Plan, which set out policies for development and the use of land.
EA	Environment Agency
FRMS	Flood Risk Management Strategy
Flood & Water Management Act	Part of the UK Government's response to Sir Michael Pitt's Report on the Summer 2007 floods, the aim of which (partly) is to clarify the legislative framework for managing surface water flood risk in England.
Flood Storage Area (FSA)	Land which provides a function of flood conveyance and/or storage, either through natural processes, or by design
Flood Zone maps/ Flood Map for Planning (Rivers and Sea)	Nationally consistent delineation of Flood Zones 1 ('low probability'), 2 ('medium probability') and 3 ('high probability') of fluvial (and tidal) flooding, published on a quarterly basis by the Environment Agency. See below definitions of Flood Zones.
Flood Zone 1 Low Probability	NPPF Flood Zone, defined as areas outside of Zone 2 Medium Probability. This zone comprises land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%). Flood zones refer to the probability of river and sea flooding, ignoring the presence of defences.
Flood Zone 2 Medium Probability	NPPF Flood Zone which comprises land assessed as having between a 1% (1 in 100) AEP and 0.1% (1 in 1,000) AEP of river flooding in any year. Flood zones refer to the probability of river and sea flooding, ignoring the presence of defences.
Flood Zone 3a High Probability	NPPF Flood Zone which comprises land assessed as having a 1% AEP (1 in 100) or greater of river flooding (>1%) in any year. Flood zones refer to the probability of river and sea flooding, ignoring the presence of defences.
Flood Zone 3b	NPPF Flood Zone 3b ((Functional Floodplain), defined as areas in which water <i>has</i> to flow or be stored in times of flood. This is usually assessed as having a 5% AEP (1 in 20) of river flooding in any year.
Informal Flood Management Asset	A feature or structure that provides a flood defence function, however has not been built and/or maintained for this purpose (e.g. boundary wall)
Local Plan	The plan for the future development of the local area, drawn up by the local planning authority in consultation with the community. In law, this is described as the development plan documents adopted under the Planning and Compulsory Purchase Act 2004. Current core strategies or other planning policies, which under the regulations would be considered to be development plan documents, form part of the Local Plan. The term includes old policies, which have been saved under the 2004 Act. (<i>NPPF definition</i>)
Main River	A watercourse shown as such on the Main River Map, and for which the Environment Agency has responsibilities and powers. N.B. Main River designation is not an indication of size, although it is often the case that they are larger than Ordinary Watercourses.

National Planning Policy Framework (NPPF)	National planning policy, published by the Government in March 2012. It replaces most of the previous Planning Policy Statements, including that regarding flood risk (PPS25).
NPPF Practice Guide	Supporting guidance to the NPPF, published by the Government in March 2014 as an online resource, available at: (http://planningguidance.planningportal.gov.uk/). It replaces previously published Government guidance, including that regarding flood risk.
Neighbourhood Plans	A plan prepared by a Parish Council or Neighbourhood Forum for a particular neighbourhood area (made under the Planning and Compulsory Purchase Act 2004).
Ordinary Watercourse	All watercourses that are not designated Main River, and which are the responsibility of Local Authorities or, where they exist, Internal Drainage Boards. There are no IDBs in the borough. Note that Ordinary Watercourse does not imply a "small" river, although it is often the case that Ordinary Watercourses are smaller than Main Rivers.
Permitted Development (PD)	Permitted Development rights allow for some minor development, such as certain sizes of building extension, without planning permission.
Planning Policy Statement (PPS)	A series of statements issued by the Government, setting out policy guidance on different aspects of planning. The majority of PPSs have now been replaced by the National Planning Policy Framework, including PPS25 regarding flood risk.
PPS25	Planning Policy Statement 25: Development and Flood Risk – previous government planning policy regarding flood risk, which has now been replaced by the National Planning Policy Framework.
Previously Developed (Brownfield) Land	Land which is or was occupied by a permanent structure, including the curtilage of the developed land (although it should not be assumed that the whole of the curtilage should be developed) and any associated fixed surface infrastructure. This excludes: land that is or has been occupied by agricultural or forestry buildings; land that has been developed for minerals extraction or waste disposal by landfill purposes where provision for restoration has been made through development control procedures; land in built-up areas such as private residential gardens, parks, recreation grounds and allotments; and land that was previously-developed but where the remains of the permanent structure or fixed surface structure have blended into the landscape in the process of time. (<i>NPPF definition</i>)
Residual Risk	A measure of the outstanding flood risks and uncertainties that have not been explicitly quantified and/or accounted for as part of the design process
Risk Management Authorities (RMA)	RMAs as defined under the Flood and Water Management Act and includes the Environment Agency, LLFAs, Water Companies, District and Borough Councils, Internal Drainage Boards and the Highways Authority
Strategic Environmental Assessment (SEA)	A procedure (set out in the Environmental Assessment of Plans and Programmes Regulations 2004), which requires the formal environmental assessment of certain plans and programmes which are likely to have significant effects on the environment. (<i>NPPF definition</i>)
Supplementary Planning Document (SPD)	Documents which add further detail to the policies in the Local Plan. They can be used to provide further guidance for development on specific sites, or on particular issues, such as design. Supplementary planning documents are capable of being a material consideration in planning decisions but are not part of the development plan. (<i>NPPF definition</i>) SPDs are not subject to independent examination before adoption by a local planning authority.
Sustainability Appraisal (SA)	Appraisal of plans, strategies and proposals to test them against broad sustainability objectives. The SEA forms part of the SA.
Sustainable Development	"Development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (The World Commission on Environment and Development, 1987).
Sustainable Drainage System (SuDS)	Term covers the whole range of sustainable approaches to surface drainage management. They are designed to control surface water run off close to where it falls and mimic natural drainage as closely as possible. (<i>Based on NPPF flood risk guidance text</i>)
uFMfSW	Updated Flood Map for Surface Water
WBC or the Council	Wyre Borough Council