Cumbria Level 1 Strategic Flood Risk Assessment for Copeland Borough Council

Volume II - Technical Report

Final Draft Report

May 2018

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Copeland borough council

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Revision History

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V1.0 / February 2018	JBA internal review	Charlotte Brown (CBC) Laura Chamberlain (SLDC)
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Contract

This report describes work commissioned by Laura Chamberlain of South Lakeland District Council, on behalf of Copeland Borough Council by a letter dated 6 February 2017. The lead representative for the contract was Laura Chamberlain. Rachel Bryan and Mike Williamson of JBA Consulting carried out this work.

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Purpose

This document has been prepared as a Final Draft Report for Copeland Borough Council. Chris Hoban is the client contact for Copeland Borough Council. JBA Consulting accepts no responsibility or liability for any use that is made of this document other than by the client for the purposes for which it was originally commissioned and prepared.

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Acknowledgements

JBA would like to thank all South Lakeland District Council, Copeland Borough Council, Cumbria County Council, Environment Agency and United Utilities staff for their time and commitment to providing data and discussing the issues identified during the course of this study.

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Executive Summary

This Volume II Technical Report of the Cumbria Local Planning Authorities Level 1 Strategic Flood Risk Assessment (SFRA) for Copeland Borough Council (CBC) is in partnership with South Lakeland District Council (SLDC), Allerdale Borough Council (ABC) and the Lake District National Park Authority (LDNPA). Cumbria County Council (CCC) is the Lead Local Flood Authority (LLFA) covering each local authority area. The SFRA uses the most up-to-date available flood risk information together with the most current flood risk and planning policy available from the National Planning Policy Framework[1] (NPPF) and Flood Risk and Coastal Change Planning Practice Guidance[2] (FRCC-PPG).

The Volume I Guidance Document precedes this Volume II report and should be read before or alongside this report. Volume I has been developed to provide guidance for council officers on their roles and responsibilities in Flood Risk Management (FRM) and the policy behind it. It provides tailored and supplementary information to national, regional and local guidance in order to help each authority and other intended users to extract the information contained in the SFRA effectively.

The four Local Planning Authorities (LPA) require this Level 1 SFRA to initiate the sequential risk-based approach to the allocation of land for development and to identify whether application of the Exception Test is likely to be necessary. This will help to inform and to provide the evidence base for each authority's Local Plans.

CBC provided data and information for its latest potential development sites for allocation. An assessment of flood risk to all potential sites is provided to assist the LPA in its decision-making process for which sites to take forward and allocate for development as part of its Local Plan.

The aims and objectives of this Volume II report of the Level 1 SFRA for CBC, including those advised in the NPPF and FRCC-PPG, are:

- To investigate and identify the extent and severity of flood risk from all sources, both presently and in the future, using available data. This assessment will enable the LPAs to steer development away from those areas where flood risk is considered greatest, ensuring that areas allocated for development can be developed in a safe, cost effective and sustainable manner.
- To reflect current national policy and legislation including the NPPF and FRCC-PPG to enable the LPA to meet its statutory obligations in relation to flood risk.
- To enable the application of the Sequential Test using a Development Site Assessment spreadsheet (Appendix B) and a suite of interactive GeoPDF flood risk maps illustrating the interaction between flood risk and the potential development sites (Appendix A).
- To review surface water flood risk with equal importance to fluvial and tidal flood risk in terms of development control and management.
- To make recommendations on the suitability of potential development sites, as an evidence base for local plan making, particularly the Moorside Associated Development sites for long term uses and Corkickle, an Opportunity Site, having been identified in the town of Whitehaven to support the potential supply chain for new housing for workers at the new power station at Moorside in the borough.
- To identify those sites that may not be suitable for development, based on flood risk, and those that will be required to pass the second part of the Exception Test, assuming the Sequential Test and the first part of the Exception Test have been passed.
- To 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.
- To recognise the cross boundary nature of flooding issues across the authority area, and work collaboratively across boundaries and with all relevant Risk Management Authorities.
- To adopt a catchment based approach to flood risk assessment and management to help inform potential cross local authority boundary approaches and solutions.
- To identify land required for current and future flood management that should be safeguarded, as set out in the NPPF, and that could be incorporated in CBC's Green Infrastructure Strategy, anticipated to be undertaken in Summer 2018.

1 http://planningguidance.planningportal.gov.uk/blog/policy/

2 http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/

- To provide guidance for developers and local authority planning officers on planning requirements in relation to flood risk.
- To provide a reference document to which all parties involved in development planning and flood risk can reliably turn to for initial advice and guidance.
- To consider a precautionary approach to climate change in the absence of modelled data accounting for the Environment Agency's (EA) allowances for climate change.
- To provide guidance for developers and planning officers on planning requirements and to identify the requirements for site-specific flood risk assessments.

A number of potential development sites are shown to be at varying risk from fluvial (Table 1-1), surface water flooding (Table 1-2), and residual risk. These tables summarise the results of the site screening process in the Development Site Screening spreadsheet in Appendix B.

Table 1-1: Number of potential development sites at risk from fluvial /tidal flooding

Potential development Site	Number of sites within…			
	Flood Zone 1*	Flood Zone 2	Flood Zone 3a	Flood Zone 3b
Residential	214	29	26	11
Employment	27	13	6	3
Mixed use	15	9	8	3
Community garden	2	0	0	0
Total	**256**	**51**	**40**	**17**
*Sites with 100% area within Flood Zone 1				

Table 1-2: Number of potential development sites at risk from surface water flooding

Potential development Site	RoFSW flood zone		
	Low risk (1 in 1000)	Medium risk (1 in 100)	High risk (1 in 30)
Residential	159	109	83
Employment	32	25	21
Mixed use	18	14	11
Community garden	2	0	0
Total	**209**	**148**	**115**

Development viability assessments for all potential sites are summarised through a number of strategic recommendations (see

Table 1-3) and the Development Sites Assessment spreadsheet in Appendix B. The strategic recommendations broadly entail the following:

- Strategic Recommendation A - consider withdrawing the site based on significant level of fluvial or surface water flood risk and site vulnerability;
- Strategic Recommendation B - Exception Test required if site passes Sequential Test;
- Strategic Recommendation C - consider site layout and design around the identified flood risk if site passes Sequential Test, as part of a detailed FRA or drainage strategy;
- Strategic Recommendation D - site-specific FRA required; and
- Strategic Recommendation E - site permitted on flood risk grounds due to little perceived risk, subject to consultation with the LPA / LLFA.

Table 1-3: Number of potential development sites to which each strategic recommendation applies

Potential development Site	Strategic Recommendation				
	A	B	C	D	E
Residential	9	7	98	86	51
Employment	0	0	3	33	4
Mixed use	1	1	13	6	3
Community garden	**0**	**0**	**0**	**2**	**0**
Total	**10**	**8**	**114**	**127**	**58**

Of the 10 sites that are recommended for withdrawal from allocation, six are based on significant surface water flood risk and four based on their location within Flood Zone 3b. Of the 10, nine are proposed for residential use only and one for mixed uses that entail residential use.

Any area within Flood Zone 3b must be left as open green space or the site boundary amended to remove the site from the risk area. If this is not possible, the site should be withdrawn. For those at surface water risk, appropriate SuDS must be used to mitigate the risk, preferably, on-site. If mitigation through suitable SuDS is not possible, the site should be withdrawn.

For sites at risk from surface water flooding, upon further investigation, such sites may be large enough to accommodate risk on-site without impacting too heavily on development expectations. More detailed assessment of site conditions would be required to ascertain whether there are actual surface water flow paths through the sites or whether risk is confined to certain areas in natural depressions. Flood depths and hazards; ground condition assessments for SuDS; and provision for safe access and egress points during a flood would also need to be gauged. A detailed site design and drainage strategy together with a detailed FRA would have to show each site would be safe for its lifetime, which is 100 years for residential.

Eight potential development sites would be subject to the Exception Test, which must be passed, assuming each site has previously passed the Sequential Test.

Included within this Level 1 SFRA, along with this Volume II Technical Report, are:

- Volume I Guidance Document;
- Detailed interactive GeoPDF maps showing all available flood risk information together with the potential development sites - Appendix A; and
- Development Site Assessment spreadsheet detailing the risk to each site with recommendations on development - Appendix B;
- A note on the delineation of the functional floodplain following discussion and agreement between CBC, the LLFA and the EA - Appendix C.

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Abbreviations

ABC ..... Allerdale Borough Council
ABD ..... Areas Benefitting from Defences
ACDP ..... Area with Critical Drainage Problems
AEP ..... Annual Exceedance Probability
AIMS ..... Asset Information Management System
AStGWF ..... Areas Susceptible to Groundwater Flooding
CBC ..... Copeland Borough Council
CC ..... Climate change
CCA ..... Civil Contingencies Act
CCC ..... Cumbria County Council
CDA ..... Critical Drainage Area
CFMP ..... Catchment Flood Management Plan
CIL ..... Community Infrastructure Levy
CSO ..... Combined Sewer Overflow
DCLG ..... Department for Communities and Local Government
Defra ..... Department for Environment Food and Rural Affairs
DPD ..... Development Plan Documents
DTM ..... Digital Terrain Model
EA ..... Environment Agency
FAA ..... Flood Alert Area
FCA ..... Flood Consequence Assessment
FCDPAG ..... Flood and Coastal Defence Project Appraisal Guidance
FCERM ..... Flood and Coastal Erosion Risk Management Network
FDGiA ..... Flood Defence Grant in Aid
FEH ..... Flood Estimation Handbook
FRA ..... Flood Risk Assessment
FRCC-PPG ..... Flood Risk and Coastal Change Planning Practice Guidance
FRM ..... Flood Risk Management
FRMP ..... Flood Risk Management Plan
FRMS ..... Flood Risk Management Strategy
FRR ..... Flood Risk Regulations
FSA ..... Flood Storage Area
FWA ..... Flood Warning Area
FWMA ..... Flood and Water Management Act
GiA ..... Grant in Aid
GI ..... Green Infrastructure
GIS ..... Geographical Information Systems
HFM ..... Historic Flood Map

IDB	Internal Drainage Board
LA	Local Authority
LDNPA	Lake District National Park Authority
LDF	Local Development Framework
LFRMS	Local Flood Risk Management Strategy
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
LRF	Local Resilience Forum
MAFRP	Multi-Agency Flood Response Plan
NFM	Natural Flood Management
NGO	Non-Governmental Organisation
NNB	Nuclear New Build
NPPF	National Planning Policy Framework
NSIP	Nationally Significant Infrastructure Project
PCPA	Planning and Compulsory Purchase Act
PFRA	Preliminary Flood Risk Assessment
RBD	River Basin District
RBMP	River Basin Management Plan
RoFSW	Risk of Flooding from Surface Water map
RMA	Risk Management Authority
RoFRS	Risk of Flooding from Rivers and the Sea Map
RSS	Regional Spatial Strategy
SA	Sustainability Appraisal
SEA	Strategic Environmental Assessment
SEPA	Scottish Environmental Protection Agency
SFRA	Strategic Flood Risk Assessment
SHLAA	Strategic Housing Land Availability Assessment
SLDC	South Lakeland District Council
SMP	Shoreline Management Plan
SoP	Standard of Protection
SPD	Supplementary Planning Documents
SuDS	Sustainable Drainage Systems
SWMP	Surface Water Management Plan
UDP	Unitary Development Plan
UKCIP02	UK Climate Projections 2002
UKCP09	UK Climate Projections 2009
UU	United Utilities
WFD	Water Framework Directive
WwNP	Working with Natural Processes

1 Introduction

South Lakeland District Council (SLDC) commissioned JBA Consulting by a letter dating 6 February 2017 for the undertaking of a Level 1 Strategic Flood Risk Assessment (SFRA). This commission, collectively called the Cumbria Local Planning Authorities Level 1 SFRA, is also in partnership with Copeland Borough Council (CBC), Allerdale Borough Council (ABC) and Lake District National Park Authority (LDNPA) who also required a Level 1 SFRA. Upon commission, each Local Planning Authority (LPA) was in the process of preparing new Local Plans for their authority areas.

This Volume II Technical Report follows on from the Volume I Guidance Document and is focused on CBC. Volume I is applicable to all four LPAs, containing guidance for council officers and developers on their roles and responsibilities in flood risk management (FRM) and the policy behind it. It provides tailored and supplementary information to national, regional and local guidance in order to help each authority and other intended users extract the information contained in the SFRA effectively. Given that Cumbria County Council (CCC) is the Lead Local Flood Authority (LLFA) for Cumbria, much of the LLFA related duties, plans and guidance is included within Volume I.

Note that there is a large area of Copeland that is within the Lake District National Park (LDNP), see Figure 2-1. The LDNPA is the LPA for the National Park and therefore has complete autonomy over development and planning for any location within the LDNP. This report is therefore specific to the areas of Copeland outside of the National Park for which CBC is the LPA.

1.1 Cumbria LPAs Level 1 SFRA

This SFRA has been carried out in accordance with the Government's latest development planning guidance including the National Planning Policy Framework[3] (NPPF) and flood risk and planning guidance called the Flood Risk and Coastal Change Planning Practice Guidance (FRCC-PPG). The latest guidance is available online via:

http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change

As discussed, the Cumbria LPAs Level 1 SFRA has been produced over two volumes separating the discussion of flood risk policy and guidance applicable to all four authorities (Volume I), from the detailed assessment of flood risk through each authority area (Volume II). Volume I should be read before or alongside this Volume II report. Volume II comes in four separate reports, specific to each authority, whilst at the same time implementing a catchment-based approach to link all documents together, with this document specific to Copeland.

Whilst separated to help everyday users of the SFRA focus on areas of interest, there are still important links between volumes I and II, and one should not be read without the other. For instance, Volume II assesses the spatial distribution of risk across the specific authority, whilst Volume I provides the discussion and guidance needed in how to put this information into practice when taking account of flood risk in development plans and the level of detail required for site specific Flood Risk Assessments (FRAs).

This SFRA makes use of the most up-to-date flood risk datasets, at the time of submission, to assess the extent of risk, at a strategic level, to potential development sites for allocation in each authority's local plans. This SFRA, alongside the Volume I and II reports, includes appendices containing interactive maps showing potential development sites overlaid with the latest, readily available, gathered flood risk information and a Development Site Assessment spreadsheet showing the level of flood risk to each site following a strategic assessment of risk. This information will allow each authority to identify the strategic development options that may be applicable to each site and to inform on the application of the Sequential Test and further, sites that may be required to pass the Exception Test.

3 http://planningguidance.communities.gov.uk/blog/policy/

1.2 Aims and objectives

The aims and objectives of this Level 1 SFRA, as stated in the project brief and in the NPPF and FRCC-PPG, are:

- To investigate and identify the extent and severity of flood risk from all sources, both presently and in the future, using available data. This assessment will enable the LPAs to steer development away from those areas where flood risk is considered greatest, ensuring that areas allocated for development can be developed in a safe, cost effective and sustainable manner.
- To reflect current national policy and legislation including the NPPF and FRCC-PPG to enable the LPA to meet its statutory obligations in relation to flood risk.
- To enable the application of the Sequential Test using a Development Site Assessment spreadsheet (Appendix B) and a suite of interactive GeoPDF flood risk maps illustrating the interaction between flood risk and the potential development sites (Appendix A).
- To review surface water flood risk with equal importance to fluvial and tidal flood risk in terms of development control and management.
- To make recommendations on the suitability of potential development sites, as an evidence base for local plan making, particularly the Moorside Associated Development sites for long term uses and an Opportunity Site been identified in the town of Whitehaven to support the potential supply chain for new housing for workers at the new power station at Moorside in the borough.
- To identify those sites that may not be suitable for development, based on flood risk, and those that will be required to pass the second part of the Exception Test, assuming the Sequential Test and the first part of the Exception Test have been passed.
- To 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.
- To recognise the cross boundary nature of flooding issues across the authority area, and work collaboratively across boundaries and with all relevant Risk Management Authorities.
- To adopt a catchment based approach to flood risk assessment and management to help inform potential cross local authority boundary approaches and solutions.
- To identify land required for current and future flood management that should be safeguarded, as set out in the NPPF, and that could be incorporated in CBC's Green Infrastructure Strategy, anticipated to be undertaken in Summer 2018.
- To provide guidance for developers and local authority planning officers on planning requirements in relation to flood risk.
- To provide a reference document to which all parties involved in development planning and flood risk can reliably turn to for initial advice and guidance.
- To consider a precautionary approach to climate change in the absence of modelled data accounting for the Environment Agency's (EA) allowances for climate change.
- To provide guidance for developers and planning officers on planning requirements and to identify the requirements for site-specific flood risk assessments.

1.2.1 Scope

Volume II (this document) has been produced as a central store of all flood risk information collected and produced throughout the SFRA process, relevant to Copeland. The Level 1 SFRA is focused on collecting readily available flood risk information from a number of key stakeholders, the aim being to help identify the number and spatial distribution of flood risk sources present throughout the authority area and to inform on the application of the Sequential Test for the potential allocation of development sites in the Local Plan.

This broadly entails:

- Delineation of the EA's Flood Map for Planning into the flood zones of the FRCC-PPG including the functional floodplain (Flood Zone 3b)
- Identification of flood risk from 'other' sources including surface water, groundwater, sewers, canals and residual risk from defence infrastructure or reservoir dam failure
- Consideration of the impact of climate change using the EA's latest allowances (last updated February 2017) where available
- Review of historic flood events from multiple sources
- Assessment of the links between flood risk sources and potential development sites
- Development viability assessments
- Production of a range of interactive strategic flood risk maps based on this information
- Review of flood defence infrastructure and flood warning
- Recommendations for future work based on the outcomes from the Level 1 assessment

2 Study Area

According to the 2011 census population estimates[4], 70,603 people live in the Borough of Copeland, including the area within the LDNP. Situated in the west of Cumbria and including the western coastline, the Borough covers approximately 73,170 hectares of land. The largest town in the Borough is Whitehaven, with other smaller towns such as Egremont, Millom and Cleator Moor. Historically, the region primarily relied on agriculture and the nuclear industry, however tourism is now also one of the most important sources of income and employment. Sellafield nuclear powerplant, based on the western coastline and adjacent to the River Ehen, is still a major source of employment and income to the Borough.

As illustrated by

Figure 2-1, the largest Main Rivers in Copeland are the Rivers Ehen, Keekle, Esk, Bleng, Calder, Mite and Irt, which rise in the high fells of the Lake District before flowing in a general south westerly direction and out into the Irish Sea. There are many ordinary watercourses, not shown on Figure 2-1, which may also pose significant flood risk. Ordinary watercourses are any watercourses that are not designated Main River.

The presence of built up areas in low lying locations along the coast, such as Whitehaven, Egremont, Millom, Cleator Moor, Haverigg, Seascale, St Bees and Parton means that tidal flooding is a significant source of risk to these towns, and to beach properties at Braystones, Nethertown and Coulderton. According to the 2007 SFRA, the greatest risk of flooding to Copeland is from tidal sources. Fluvial flooding, culvert related problems and sewer network failure comprise other sources of flood risk within the borough[5].

The topography of the area is characterised by the high fells of the Lake District to the east from where the rivers drain south and westwards towards the Irish Sea. The valley floors often have large expanses of floodplain and the steep nature of catchments means water is transferred to the channels relatively quickly.

To the north, the bedrock geology of the mountainous areas is made up of igneous rocks with areas of mudstone, sandstone and siltstone. To the south, the lower lying regions consist of interbedded sedimentary rocks (mudstone, siltstone, sandstone and conglomerate). Areas in the easternmost and southernmost parts of the Borough are characterised by limestone bedrock. Superficial deposits in the valleys are largely composed of glacial till and alluvial sand and gravel.

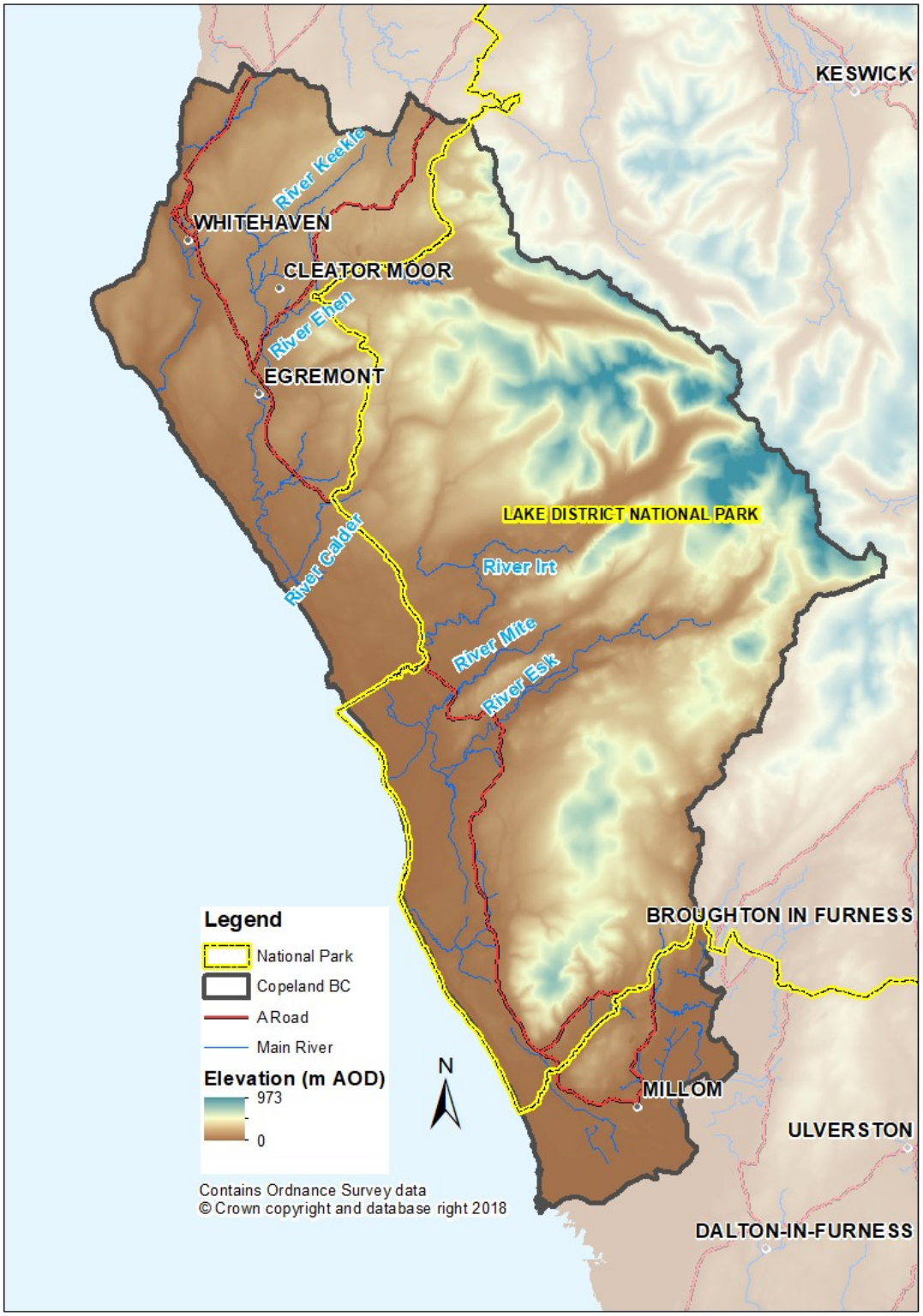
The upland region is cut by deeply dissected, glaciated valleys radiating from the core of the Lake District. Away from the Lake District core, the topography becomes much flatter (Figure 2-1:CBC study area) especially where the bedrock is masked by glacial deposits such as the Solway lowlands and the coastal plain southwards from St Bees to the Duddon Estuary (Akhurst et al., 1997).

Note that this Volume II report is focused on Copeland as the LPA and not the area within the LDNP which falls under the jurisdiction of the LDNPA.

4 http://www.ons.gov.uk/ons/guide-method/census/2011/index.html

5 Copeland Borough Council 2007 Strategic Flood Risk Assessment

Figure 2-1:CBC study area



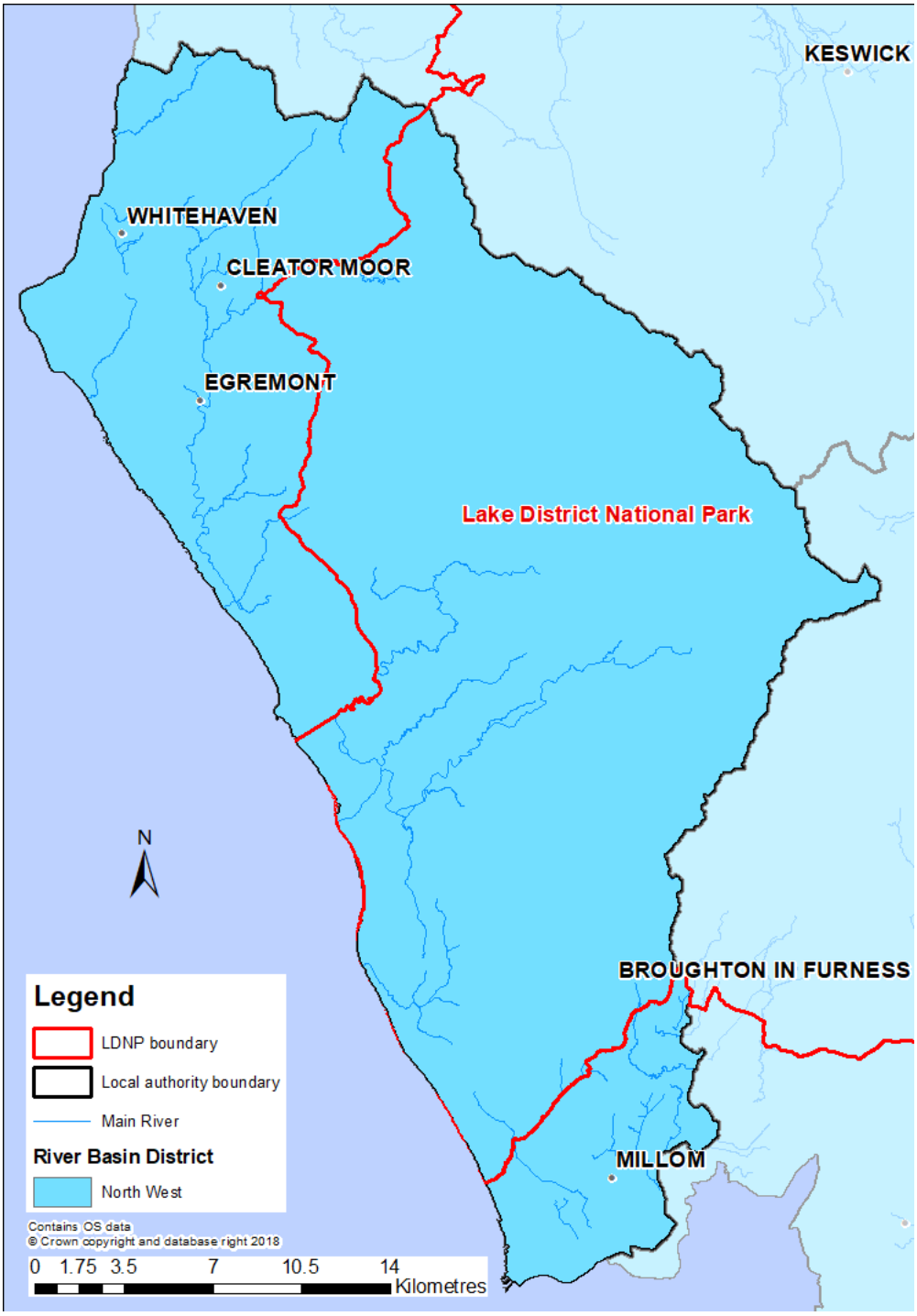
3 The Planning Framework and Flood Risk Policy

Volume I details the interaction between planning policy and flood risk management policy including the NPPF and the FRCC-PPG. This section follows on from the information provided in Chapter 4 of Volume I but is specific to Copeland.

3.1 River Basin District Flood Risk Management Plans

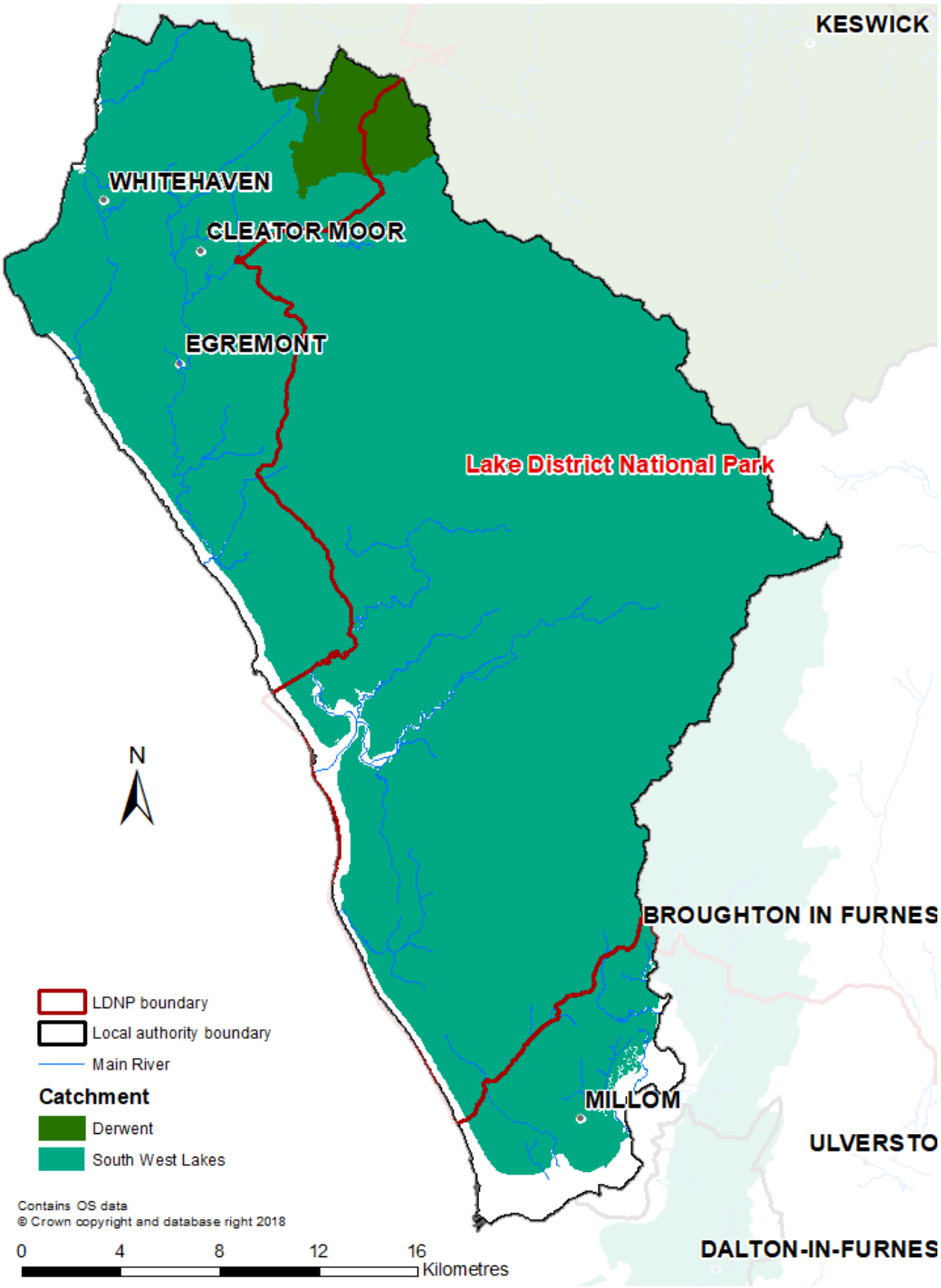
As explained in the Volume I report, the Copeland authority area is completely within the North West River Basin District (RBD) as shown on Figure 3-1.

Figure 3-1 North West RBD



The two main river catchments within Copeland are the River Derwent and South West Lakes catchments, each within the North West RBD. Figure 3-2 illustrates the two catchments within the CBC boundary.

Figure 3-2 Main river catchments



3.1.1 South West Lakes Catchment

The South West Lakes catchment is predominantly rural with 92% being used for agricultural purposes. Policies within the South West Lakes catchment will have a significant effect on flood risk across the Copeland district with the catchment covering almost the entire area, as can be seen in Figure 3-2. Part B of the North West RBD FRMP, details that 7,000 people are at risk from

river and sea flooding within the South West Lakes catchment. This is compared to 6,000 within the Derwent catchment.

The FRMP Part B summarises various flood risk measures to help manage flood risk in the South West Lakes catchment with the majority applicable to Copeland including:

- Preventing risk:
  - A study is required to focus on the combined risk in Whitehaven from flooding from Pow Beck, minor watercourses, drains, surface water and groundwater and flooding from high tides.
  - Develop adaptation strategy for properties on beach in Braystones, Nethertown and Coulderton areas to facilitate relocation to a more sustainable site in the medium term.
- Preparing for risk:
  - Improve flood warning and flood forecasting services including education required for people to take effective action. Take up of flood warning service could be improved from 8% at present
  - Plans for implementing an additional Flood Warning Area at Braystones Village but not for Beckermet
  - Consult Eskmeals site operator over approaches to coastal adaptation in Moderate and long term to allow roll back of facilities in dunes.
  - Undertake a feasibility study for defence improvement works at Seascale, to confirm if works are justified and appropriate timing of interventions
  - Network Rail to develop a strategic plan for monitoring and managing risks to the railway infrastructure to inform requirements for works and next revision of the Shoreline Management Plan (SMP).
- Protecting from risk:
  - Encourage the use of flood resilience and flood proofing to existing properties in Harrington through the provision of information and seek appropriate opportunities for funding this measure
  - A study at Nor Beck has been completed which recommends increasing the capacity of the culvert at Cleator along with upstream storage to reduce the risk of flooding from Nor Beck
  - A pre-feasibility study for Poaka Beck recommended a detailed assessment of a potential scheme. This could include: flood storage, improving existing local defences or constructing new ones and/or increasing flow capacity of culverts and defences

3.1.2 River Derwent Catchment

This catchment is predominantly rural with only five towns within an area of 1,235 square kilometres. Policies within the River Derwent catchment will only affect a small proportion of Copeland (Figure 3-2).

The FRMP[6] identifies certain investment programs targeted within the Derwent catchment, including water company investment programs, Flood Risk Management investment programs and catchment level government funded improvements. For example, funding from the flood risk management investment program has been secured to deliver mitigation measures in water bodies designated for flood protection.

The FRMP summarises various flood risk measures to help manage flood risk in the Derwent catchment. The following may be applicable to the area in north west Copeland:

- Preparing for risk:
  - Review whether a flood warning service could be effectively implemented in vulnerable villages using a forecasting model which exists for areas of the

6 https://www.gov.uk/government/collections/river-basin-management-plans-2015#north-west-river-basin-district-rbmp:-2015

catchment. Lead times will be short and false alarm rates may be high but some warning may be feasible.

- Protecting from risk:
  - Lake District valley river systems function in a more natural way to reduce flood risk: National Trust to work with stakeholders and tenant farmers to explore natural flood risk measures: Look at where flood risk and erosion can be reduced by natural methods.
  - Promote Slowing the Flow/Natural Flood Management (e.g. on the River Marron) to benefit communities at risk of flooding e.g. river restoration opportunities. Work would focus on flood and erosion damages and be subject to consultation with local communities and farmers with consideration of impacts on the landscape and amenities. Instrumentation and monitoring, if part of any changes, could provide important evidence for future land management change.
  - Where localised surface water problems exist at villages, they should be addressed with an appropriate response by promoting flood resilience measures and / or small scale local works either by the Making Space for Water groups or if justifiable by the EA.

3.2 Shoreline Management Plan (SMP)

As discussed in Volume I, the whole Cumbrian coastline is covered by the North West England and North Wales SMP2[7]. There are three shoreline management policies in place along Copeland's coastline, namely 'hold the line', 'managed realignment' and 'no active intervention'. Figure 3-3 is an extract from the North West England and North Wales SMP2 report showing the policy options for managing flood risk along the coast. The policy option 'advance the line' is not applicable to the Cumbrian coastline.

Figure 3-3 SMP2 policies for managing the shoreline

Policy Option	Description
Hold the line	By maintaining or changing the current standard of protection. This policy includes those situations where work is carried out in front of the existing defences (such as beach recharge, rebuilding the toe of a structure, building offshore breakwaters and so on) to improve or maintain the standard of protection provided by the existing defence line. It also includes work behind existing defences (such as building secondary flood defences) where this work would form an essential part of maintaining the current coastal defence system.
Advance the line	By building new defences on the seaward side of the original defences. Use of this policy is limited to those policy units where significant land reclamation is considered.
Managed realignment	By allowing the shoreline to move backwards or forwards, with management to control or limit movement (such as reducing erosion or building new defences on the landward side of the original defences).
No active intervention	Where there is no investment in coastal defences or operations.

Table 2: Descriptions of the four shoreline management policies used in SMP2

3.2.1 Hold the line

Where hold the line has been proposed, the intent is to manage the risk from coastal flooding or erosion to important assets and interests in an appropriate way. This could be achieved by

7 North West England and North Wales Shoreline Management Plan SMP2, North West & North Wales Coastal Group, Main SMP2 Document, 2012

maintaining current defences or by constructing new defences in the future. When upgrading defences or significant changes in management practice is required, this is progressed through a Strategy or Scheme and will be subject to more detailed appraisal, consultation and consenting.

In the short term, over the next 20 years, this policy is in place on the Copeland coastline where there are key assets, infrastructure or settlements in places such as proposed Nuclear New Build (NNB) Moorside site (Spring 2018), adjacent to Sellafield, the town of Whitehaven and the village of Seascale. There is also a large section of coastline in the south of the borough along the Duddon Estuary to which this policy applies for the continued protection of agricultural land.

3.2.2 Managed realignment

Managed realignment provides the opportunity to create a more natural coastline by allowing sediment movement which helps maintain beaches or provides space for natural landward roll-back of saltmarsh, beaches or dunes in response to ongoing coastal change and sea level rise.

The SMP2 recognises that there are a number of opportunities to move defences landward, or to remove defences so the shoreline realigns back to higher ground, in order to create more space for salt marshes and hence improve the natural defence and provide environmental benefits. However, in locations where managed realignment is proposed, the SMP2 does not generally define or predict the new shoreline or defence position. In theory, the shoreline could be moved inland up to where the area at risk of coastal flooding ends, however in reality defences are often not moved back that far, due to the presence of built or natural assets or infrastructure, where for example, Network Rail are able to intervene to protect the railway.

In the short term, over the next 20 years, this policy is in place from Sellafield to just south of St Bees.

3.2.3 No active intervention

This policy option lets nature take its course on the shoreline without any management and is usually in place where risk management is not required, or where sediment erosion from cliffs is required to feed beaches or to allow beaches, dunes or saltmarsh to adjust or rollback naturally as sea levels rise. This policy can also apply where there is insufficient national economic justification to maintain defences in the long term and therefore no funding available from public sources.

In the short term, over the next 20 years, this policy is in place along the headland at St Bees Head located southwest of Whitehaven and on the Duddon Estuary at Millom.

3.3 Planning Policy

Volume I includes background information on the national policy of the NPPF, FRCC-PPG, the Housing and Planning Act, the Localism Act and local plans. Please refer to Volume I for detailed information on national policy.

3.3.1 Copeland Borough Council Local Plan

The CBC Local Plan will consider how the Borough (outside of the National Park) will develop up to the year 2028. The Copeland Local Plan is currently made up of the following statutory planning documents which are used as the basis for determining planning applications:

- Core Strategy and Development Management Policies (adopted in 2013), which sets out broad scale overviews of the locations, types and impacts of new developments. It identifies the overall development strategy for the Borough outside the National Park, together with settlement hierarchy and growth targets. It identifies a housing target of approximately 4,000 homes over the plan period;
- Copeland Local Plan 2013-2028 Proposals Map. The purpose of this document is to extract the remaining saved policies and allocations from the Copeland Local Plan 2001-2016 together into a smaller and easier to navigate form; and
- Copeland Local Plan 2001-2016 'Saved' Policies.

The Core Strategy and Development Management Policies replaced the majority of policies in the Copeland Local Plan 2001-2016, except for a number of policies specifically relating to allocations of land that were 'saved' from the Copeland Local Plan 2001-2016. These 'saved' policies remain part of the Development Plan until they are superseded by policies and allocations in the Site Allocations and Policies Plan.

The following key planning documents support the Copeland Local Plan:

- Supplementary Planning Documents - which provide detailed guidance on the interpretation of local plan policies.
- Revised Statement of Community Involvement 2016 (SCI) – sets out the processes to be used by the Council in engaging the community in plan preparation and the consideration of planning applications.
- Local Development Scheme (LDS) - sets out the programme for preparing and updating the Local Plan.
- Annual Monitoring Report (AMR) - assesses the implementation of the Local Development Scheme and the extent to which policies in the Local Plan are being successfully implemented.

  Evidence Base – contains research and evidence used to develop and support planning policies, such as the Sustainability Appraisal and this SFRA, which should feed into the Sustainability Appraisal.

This evidence base forms part of an emerging replacement Local Plan 2017-2035 with Preferred Options anticipated to be consulted on in Summer 2018 and with replacement plan adoption anticipated in December 2019.

3.3.2 Draft Sustainability Appraisal, 2015

The Draft Sustainability Appraisal Site Allocations and Policies Plan Preferred Options[8] was produced in January 2015 to support the emerging Local Plan. Carrying out the Sustainability Appraisal (SA) alongside the production of the Local Plan allows for the potential adverse social, economic and environmental impacts to be identified at an early stage. This SFRA is designed to fit in with the SA objectives on flood risk.

The SA objective on flood risk states:

- SuDS should be incorporated into new development
- Avoid development in areas of flood risk

8 http://www.copeland.gov.uk/sites/default/files/attachments/sustainability_appraisal_0.pdf

- Mitigate any residual flood risk through appropriate measures, including through design.

With regards to policy on flood risk, SA Policy SA1 states:

"This policy has to conform with the Core Strategy and allocations made will be governed by national planning policy and Core Strategy policy ENV1. The Site Allocation Plan has also been prepared in consultation with the Environment Agency. Flood risk is a criterion in the proposed Policy SA1."

The Local Development Framework Sustainability Appraisal Scoping Report[9] carried out in 2009, listed a number of sustainability issues within Copeland, one of which causing exception to SA Policy SA1. In Whitehaven town centre, CBC would not wish to blight development plots at risk of tidal or surface water flooding. Rather than causing obstruction to development, CBC will work with developers under the supervision of the EA to ensure correct mitigation and protection measures are put in place to the highest standard.

The draft SA 2015 will be superseded by a draft SA 2018 to accompany the Preferred Options consultation anticipated to take place in Summer 2018.

3.4 Flood Risk Management Policy

Volume I details the approaches to national and local flood risk management strategies and Surface Water Management Plans (SWMPs). Please refer to Volume I for more detailed information on national flood risk management policy.

As LLFA, CCC developed a Local Flood Risk Management Strategy (LFRMS) and a SWMP for Cumbria. The LFRMS sets out how CCC will manage risk from all types of flooding across the whole of Cumbria. The SWMP, carried out in 2012, proposed seven Critical Drainage Areas (CDAs) in Cumbria, two of which are located in Copeland, in Whitehaven and Moresby Parks in the north of the borough. See Section 4.2.1 for more information on the Whitehaven and Moresby Parks CDAs.

3.4.1 Copeland Council Level 1 SFRA (October 2007)

The 2007 Level 1 SFRA was developed in accordance with the now superseded PPS25, and analysed the current and future flooding issues in the District to support LPA assessment of specific development allocation sites. A number of recommendations were made which are still applicable, including:

- A planning solution to flood risk management wherever possible, steering development away from areas affected by flooding in accordance with the Sequential Test
- In areas where the Sequential Test cannot be satisfied, site specific recommendations are required for the Council and developer to meet the Exception Test
- Future revisions to Council policy in the Local Development Framework (however now the Local Plan) should be developed in light of the suggested development control conditions in the SFRA (2007)
- The SFRA (2007) should be reviewed on a regular basis in light of better flood risk information and emerging policy guidance (hence this update)

3.4.2 Local flood studies

This section briefly describes any notable flood risk management studies, investigations or works that have recently taken place in Copeland, or upstream in the LDNP that may have impacts on downstream communities in Copeland.

Flood Investigation Reports (FIRs)

Flood Investigation Reports were produced for local towns and villages in Copeland by CCC as LLFA, with the assistance of the EA and other Risk Management Authorities (RMA) under section 19 of the Flood and Water Management Act (FWMA) 2010. Many of these reports were created following the storm event on 30th August 2012 which flooded many settlements within Copeland. The flooding at all locations could be attributed to extreme and sustained heavy rainfall. At the

9 http://www.copeland.gov.uk/sites/default/files/attachments/ldfsaconsultdraftscopingreportapr09.pdf

time, the summer of 2012 had been the wettest on record in England so when the August event occurred, surrounding fields were already saturated and therefore unable to absorb any new rainfall.

Millom and Haverigg Flood Investigation Report, 2018

This report discusses the intense rainfall event which occurred on 30th September 2017. There were no weather warnings in force at the time of the event and approximately 261 residential including commercial properties were flooded in Millom, and 10 within Haverigg, as a result of 19-22 mm / hr of rain (at its peak) overwhelming drainage systems and causing surface water to rise. However, in some locations, the cause of flooding may have been compounded by faults on some of the drainage systems. Work has begun to repair identified faults.

The recommended actions provided by CCC to reduce future flood risk for Millom and Haverigg include:

- Review and update community plans to enable homes and businesses to be better prepared for flooding and reduce the impacts of any flooding
- To ensure where possible reinstatement works following the flooding allow for resilience far any further extreme flooding event
- Investigate any opportunities to reduce the runoff from the disused Quarry between Settle Street and Castle View (completed in March 2018)
- Investigate opportunities to reduce the runoff from the footpath / New Hall Farm into Bowness Road (completed in March 2018)
- Continue to monitor silt levels within the public sewer network and arrange cleaning and review routine desilting works on a regular basis
- Work to collaborate gully cleaning, sewer cleaning, street sweeping
- Liaise with services to remove cables and pipes that have obstructed highway drainage systems in Mainsgate Road (ongoing electricity repairs carried out from w/c 08/01/18)
- Excavate on blockage on watercourse on Mainsgate Road from rear of 1970s properties to determine extent and condition of watercourse to the properties behind Mainsgate Road (when resources are available in next financial year)
- Repair highway drainage system on Salthouse Road, Haverigg (when resources are available in next financial year)
- Review network capacity of drainage systems and consider where improvements can be made (some review of public sewer system has been carried out)
- Review effect of the Crook Pool watercourse access crossings on the drainage outfall from Mainsgate Road (level survey completed)

Red Beck Park, Draft Flood Investigation Report, 2017[10]

This report discusses the groundwater flooding within the vicinity of Red Beck Park. On 22nd August 2016, there was an event that resulted in perched ground water / surface water entering the sub floors of a number of dwellings at Red Beck Park / Frizington Road. Prior to the groundwater flooding, a heavy rainfall event took place on 20th August 2016 where 45 mm of rainfall fell between 04:00am and 21:15pm. This is likely to have saturated soils and increased the height of the water table in the area.

The recommended actions provided by CCC to reduce future flood risk for Red Beck Park include:

- Ongoing and annual cleaning of gullies including tracing highway pipework in the area
- Trace all watercourses leading to the tributary of the River Ehen next to the primary school
- Investigate options for reducing groundwater flows from fields to the north east with runoff attenuation features, such as cut-off ditches, bunds and upland storage ponds
- Take action for flood protection to properties as and when residents think it is appropriate

10 http://www.cumbria.gov.uk/elibrary/Content/Internet/544/3887/6729/6732/42957123252.pdf?timestamp=42983144355

St Bees Flood Investigation Report, 2014[11]

This report details the flooding that occurred in St Bees on 30th August 2012. Since 1981 to 2010, the average rainfall for August was 92 mm. Met office data from a rain gauge at St. Bees Head recorded a total of 45 mm over the duration of the storm, 29th-30th August 2012.

21 properties (9 internal and 12 external) were reported to have suffered from flooding as a result of surface water runoff from agricultural land which flowed down adjacent roads into low lying populated areas of the village.

Further actions recommended to manage future flood risk for St Bees include:

- Restore and identify defects in natural drainage patterns along High House Road, B5345, Egremont Road and Fairladies as closely as possible
- Reduce the volume of runoff that reaches High House Road, Nethertown Road and from Scalebarrow Hill
- Reduce water on road surface/ convey water across High House Road e.g. a cattle style grid
- Keep gullies free of falling leaves through increasing the frequency of road sweeping/residents' self-resilience
- Identify flow routes through gardens
- Determine the source of flooding at Station Road
- Ensure road drainage at Tomlin House can cope with maximum possible volume through investigation and repair of the damaged gully pipe
- Determine if drainage can discharge at Peckmill

Coulderton Flood Investigation Report, 2014[12]

This report examines the flooding at Coulderton on the 30th August and the 17th October 2012, detailing the flood routes. On the night of 29-30th August 2012, rainwater ran off the high ground onto the road and flooded a property internally to a depth of 600 mm. The road, which is the main access to the village, was covered deep in silt and mud. Highway drainage serving the hamlet was unable to accommodate the intense runoff from the higher ground above Coulderton.

CCC has provided several recommendations to reduce flood risk to properties in Coulderton:

- Reduce the risk of sediment blocking the drainage system
- Look at ways of improving land management to reduce soil erosion and runoff from the fields above Coulderton
- Remove restriction/blockage in the pipe at the bottom of Well Lane
- Investigate ways of dealing with flood flows greater than capacity of current highway system and scope for funding.

New Mill Flood Investigation Report, 2014[13]

Properties in the hamlet of New Mill suffered internal and external (mainly) fluvial flooding due to insufficient capacity in the New Mill Beck and associated culverts.

Recommended actions to manage future flood risk in New Mill include:

- Improvements in culvert capacity to ensue all are flowing effectively
- Provide a route across culverts for exceedance by investigating potential for realigning the downstream wing wall of the culvert under A595

11 http://www.cumbria.gov.uk/elibrary/Content/Internet/544/3887/6729/6732/41765111145.pdf?timestamp=42971102631
12 http://www.cumbria.gov.uk/elibrary/Content/Internet/544/3887/6729/6732/41765163535.pdf?timestamp=42971102631
13 http://www.cumbria.gov.uk/elibrary/Content/Internet/544/3887/6729/6732/41761164611.pdf?timestamp=42971102631

- Encouraging landowners to maintain watercourses by establishing a maintenance regime for clearing foliage and removing silt in areas that fall within their responsibility
- Investigate options for reducing flows in the Beck (attenuation or limiting flows upstream)
- Ensure bunding is adequate to stop overflow from Ponsonby Old Hall

Seascale Flood Investigation Report, 2014[14]

The Flood Investigation Report for Seascale provides a comprehensive analysis of the impact caused by the flooding on 30th August 2012. 23 properties were reported to have suffered internal flooding in four areas of the village. Very intense rainfall was the ultimate cause of flooding (37 mm in 6hs 30mins) and the poor performance of culverts within the drainage systems contributed to the flooding impacts.

Along with the majority of recommendations described in the FIRs for Calder Bridge and New Mill, and with help from organisations and communities, further actions to manage future flood risk in Seascale include:

- Ensure EA Detailed River Network is correct to prove route of How Farm Stream by dye testing (complete)
- Improve sewer systems in the village and ensure that they are flowing effectively
- Look for opportunities to reduce surface water in the combined sewer
- Improve highway drainage capability of gullies and ensure all are flowing effectively
- Divert certain flows to a higher level/location (The Fairways)
- Fairways culvert obstruction - requires investigation
- Prevent flood waters rising from Whitriggs Beck and flooding properties in the Railway Terrace area by funding bids to Defra for a continuous culvert and raising the wall on the open section of the beck

Sandwith Flood Investigation Report, 2014[15]

Sandwith FIR details the flooding that the village of Sandwith suffered during the excessive rainfall events that occurred on 22nd June and the 30th August 2012. There were many rainfall events during the month of August in 2012, with some lasting continuously up to 12 hours. The weather radar indicated that it rained virtually every day over Sandwith in the second half of the month. On 29th August, it rained almost continuously from just after 9:30am until just before 3:00am on the 30th August with rainfall intensities of up to 20 mm/hr.

The main cause of the flooding appears to be from surface water runoff from fields previously saturated by the succession of rainfall events, some with durations of up to 24 hours. Changes in land management practises contributed significantly to flooding in some areas. Blocked highway drainage systems also contributed to the flooding but this is not unusual under the circumstances. However, it was found that this drainage system had insufficient capacity to deal with such runoff volumes.

Recommended actions include:

- Investigate damaged culverts at Townhead (complete)
- Investigate options for intercepting surface water flows from fields with cut-off ditches and/or land drains
- Review land management to avoid flooding to neighbouring land from fields

14 http://www.cumbria.gov.uk/elibrary/Content/Internet/544/3887/6729/6732/41765104945.pdf?timestamp=42971102631
15 http://www.cumbria.gov.uk/elibrary/Content/Internet/544/3887/6729/6732/41765163924.pdf?timestamp=42971102631

Whitehaven, Flood Investigation Report, 2014[16]

This report was completed after CCC LFRM Team received information about surface water flooding from the fields behind Victoria Road, Whitehaven during a rainfall event on the 17th October 2012. This led to a site visit in partnership with CBC, who had already carried out several investigations in this area.

In the early hours of the 16th October 2012 heavy rainfall fell with intensities of up to 10 mm/hr. There were further low intensity rainfall events commencing in the early hours of the 17th August before becoming almost continuous from about 10:30am until just after 7:00pm when the rainfall ceased. It peaked at about 12:40pm with an intensity of about 30 mm/hr. This heavy prolonged rainfall falling onto already saturated, steeply sloping ground was the primary cause of the flooding. The resulting surface water runoff overwhelmed any land drainage systems in place at the foot of the sloping ground and consequently floodwaters flowed through gardens and between properties onto the road.

Recommended actions include:

- Maintain flows in watercourses by repairing damaged culverts and establishing a maintenance regime for keeping them clear.
- Maintain land drains by establishing a maintenance regime and renew damaged land drains
- Lay cut-off drains at foot of field
- Investigate conditions of culverts and damaged drainage systems and confirm presence of intrusive tree roots.

Calder Bridge Flood Investigation Report, 2014[17]

The village of Calder Bridge, located in the LDNP within Copeland, experienced severe flooding on the 30th August 2012. Intense rainfall from 9:00 pm on 29th August continued until approximately 3:30 am on 30th August, according to rainfall records, and therefore caused the excessive storm event. This rainfall event peaked between 12:45 am and 01:05 am with an intensity of up to 30 mm/hr and caused severe flooding to Calder Bridge.

In response to the flood event, CCC as LLFA and other RMAs completed this Flood Investigation Report. This includes subsequent impacts within Calder Bridge and future recommendations which will identify any areas that can be improved to reduce the potential impact of flooding.

CCC Highways Team identified the sources of runoff to be from surrounding fields from Ponsonby Road. The LLFA has since carried out remedial works to deal with the consequences. Several recommendations have been identified that would help to minimise the risk of future flooding, which include:

- Consider flood resilience measures to properties that are likely to be affected by future flood events
- Road gullies and highway drainage systems cleaned out along A595 and Ponsonby Road (completed)
- Ditch has been partially cleaned on Ponsonby Road but more capacity needs to be obtained (partially complete at the time of writing)
- Upgrade highway drainage outfall and investigate further flood exceedance routes by exploring condition and catchment of surface water drains crossing A595 200 m south of the bridge
- Investigate options for intercepting surface water flows from fields with bunds, cut-off ditches and/or land drains
- Review land management practices to avoid flooding from fields

16 http://www.cumbria.gov.uk/elibrary/Content/Internet/544/3887/6729/6732/4176516480.pdf?timestamp=42971102631

17 http://www.cumbria.gov.uk/elibrary/Content/Internet/544/3887/6729/6732/4176112538.pdf?timestamp=42971102631

- Clearing and cleaning of highway drains and gullies must be a part of regular maintenance routines to avoid any future obstructions or blockages.

Ravenglass Flood Investigation Report, 2014[18]

Ravenglass, located in the LDNP within Copeland, experienced significant flooding on 30th August 2012. As a result, 14 properties were reported to have suffered internal flooding. The most significant flooding occurred as a result of surface water collected at the low point under the railway bridge which was trapped behind a sea defence embankment. Highway drainage systems have been provided to convey water through the embankment, but they were found to be damaged when inspected. In another two areas, properties alongside the main street suffered from flooding as a result of surface water runoff from high ground.

Recommendations to minimise the risk of future flooding include:

- Ensure highway drainage system is repaired, clean and functioning
- Reduce runoff volumes from fields onto Main Street by investigating improved methods of land management and flow routes
- Ensure car park drainage system is able to operate at full capacity
- Investigate where the surface water drainage outfall is located. If combined sewer, remove connection to remove risk of sewage flooding

Gosforth Flood Investigation Report 2014[19]

The 30th August 2012 rainfall event caused flash flooding that carried silt and debris onto roads and into watercourses, congesting culverts and highway drainage networks, leading to restrictions in flow. In other areas, it was found that the cross-sectional areas of several watercourses had been reduced by riparian owners.

This report examines the flooding at Gosforth, also located in the LDNP within Copeland, on the 30th August 2012, detailing flood routes and reported affected properties. Drainage infrastructure was unable to accommodate the intense runoff from the steeply sloping fields above Gosforth. The fields were saturated and unable to absorb the intense rainfall resulting in flash flooding beyond the capacity of watercourses, culverts and surface water drainage systems in Gosforth.

It is thought that most of the actions to come out of the FIR will require a spirit of working together from the Gosforth community with clear guidance and support from the LLFA and working with Making Space for Water officers. To minimise the risk of future flooding in Gosforth, the LLFA are proceeding with a scheme that has allocated funding. Recommended actions include:

- Maintain flows in watercourses and culverts under highways and investigate their efficiency
- Investigate feasibility of providing an overflow at the downstream end of the Wasdale Road culvert at Ellerslie Park
- Investigate options for intercepting surface water flows from fields with runoff attenuation features, such as cut-off ditches, bunds and upland storage ponds

Woodend Farm Flood Investigation Report, 2013[20]

This report details the flooding that occurred at Woodend Farm on 30th August 2012 and again on 17th October 2012. During the night of 29-30th August 2012 intense rainfall resulted in a rise in levels of the beck (unnamed watercourse) adjacent to Woodend Farm, exacerbated by a restriction to flows at the culvert. Water rose out of the channel flooding Woodend Farm to a depth of 300 mm. The resident had installed flood protection measures after previous incidents however these failed during the event. Flood water also entered the property across the road (Woodend House) to a lesser extent but enough to cause internal damage.

Recommended actions proposed for Woodend Farm include:

- Increase capacity and reduce surface water in the culvert

18 http://www.cumbria.gov.uk/elibrary/Content/Internet/544/3887/6729/6732/41765161827.pdf?timestamp=42971102631
19 http://www.cumbria.gov.uk/elibrary/Content/Internet/544/3887/6729/6732/41765162620.pdf?timestamp=42971102631
20 http://www.cumbria.gov.uk/elibrary/Content/Internet/544/3887/6729/6732/41765162150.pdf?timestamp=42971102631

- Investigate the feasibility of upstream attenuation as a means of downstream flow reduction

3.4.3 Flood Risk Partnerships and Partnership Plans

Partnerships and plans related to flood risk generally come under the control of the LLFA. A number of partnerships involving CCC have been cited in Volume I.

There is a joint venture for managing Flood Risk in Egremont[21]. This joint venture is between CBC, the EA and CCC, who aim to help reduce the risk of flooding in Egremont. Flood risk in Egremont is complex and comes from a number of sources, including fluvial, surface water, drainage problems and runoff from local fields.

Chapter 7 of the Volume I report details emergency planning provisions for Cumbria, such as:

- The Cumbria Local Resilience Forum,
- The Cumbria Community Risk Register,
- The Community Emergency Plan,
- Household Emergency Checklist,
- Local flood plans,
- Flood warning and awareness, and
- Evacuation plans.

3.4.4 Open Space Assessment (2011)

As discussed in Volume I, the NPPF explains that open space can perform many functions, including flood risk mitigation, and that Local Plans should account for increased flood risk, resulting from climate change, through the planning of Green Infrastructure.

CBC published in April 2011, the CBC Open Space, Sport and Recreation Assessment which was undertaken in accordance with Planning Policy Guidance Note (PPG) 17: Planning for Open Space, Sport and Recreation & Assessing Needs and Opportunities, and its Companion Guide. PPG 17 has since been replaced by 'open space, sports and recreation facilities, public rights of way and local green space' planning practice guidance in March 2014.

The 2011 assessment report provides a comprehensive assessment of the need for all types of publicly accessible open space. The assessment does not discuss the availability of greenspace for flood risk management, though several of the greenspace typologies that are listed could potentially be used for the temporary storage of flood water. A site-specific investigation would however be required. The greenspace typologies are as follows:

- Parks and gardens
- Natural and semi-natural urban greenspaces
- Green corridors
- Outdoor sports facilities
- Amenity greenspace
- Civic spaces

Based on this assessment, the 2013 Land Allocations DPD allocates sites as greenspace where they have significant value as any of the above types or do not have significant value in their current condition but may provide quality open space if their value is enhanced. The LPA may look to review its open green space with regards to flood risk management as an action from this SFRA.

CBC have anticipated combining their draft GI with a revised Open Space Audit. This will be commissioned in Summer 2018.

21 http://www.copelandbc.gov.uk/sites/default/files/attachments/egremont_flood_leaflet_mar_2014.pdf

4 Flood Risk within Copeland

4.1 Fluvial and tidal

Judging from the EA's Flood Map for Planning, the majority of fluvial flood risk within Copeland comes from the River Ehen and Skirting Beck in Egremont; the River Keekle around Cleator Moor; Pow Beck in Whitehaven; and Kirk Beck in Beckermet.

There is also significant risk from tidal (coastal) flooding along the Copeland coastline, particularly along the lower-lying coastal flats and estuaries. The town of Millom, in the south of the district, is at high tidal flood risk, particularly in east Millom from the Duddon Estuary. Conversely to the risk here, the SMP policy along this stretch of coastline is for 'no active intervention' (see Section 3.2.3). The EA expect this to be down to a combination of lack of economic case, the rural location, low number of properties at risk, the existing Area Benefitting from Defences and also the fact that part of the area is within a Site of Special Scientific Interest (SSSI) and a Special Area of Conservation (SAC). The EA is to interrogate SMP policy justification and also the Cumbria Coastal Strategy will look into the suitability of SMP policies.

The Flood Map for Planning (described in Volume I), is used to assess fluvial and tidal risk to Copeland's potential development sites and is shown on the SFRA Maps in Appendix A.

Along with the Flood Map for Planning, historic data can also provide a valuable indicator of flood risk in areas. Section 4.5 provides details on historic flood incidents that have occurred in Copeland. Historic fluvial and tidal flood risk data has been provided by the EA and the LLFA. The SFRA Maps in Appendix A present the Flood Map for Planning which shows the fluvial and tidal coverage of flood zones 2 and 3 across Copeland, and recorded incidents of historic flooding.

4.2 Surface water

Judging from the EA's Risk of Flooding from Surface Water map (RoFSW), surface water flood risk is prevalent across the Borough though particularly in the river valleys and urban areas. The RoFSW (described in Volume I) is used to assess surface water flood risk to the potential development sites.

CBC confirms that the majority of flood incidents in Copeland are related to surface water and that Pow Valley is particularly susceptible due to the flat nature of the terrain meaning surface water can 'pond' in the valley. Some surface water systems are also very shallow and discharge directly into Pow Beck. East Whitehaven is particularly susceptible to surface water flooding due to the steep nature of the area, underlying issues with clay soils causing numerous problems with groundwater and surface water flooding. The surface water drainage systems within Pow Valley and East Whitehaven are both adopted and private, with many constructed using pitch fibre, laid between 1950-70 and is cheaper alternative with a design life of approximately 40 years, and therefore are now often said to be inherently defective, increasing surface water flood risk. Dewatering of surface water from the sewer system or from the groundwater would be required on a large scale to help alleviate the pressure on the drainage network.

Tide-locking is also a significant issue, with the main risk occurring under scenarios when Whitehaven Harbour Commission operate the tidal sea lock doors between the inner and outer harbour during extreme high tide and tidal surge. During such scenarios, the inner harbour provides attenuation for surface water discharging into the harbour via Pow Beck culvert. However, the attenuation provided by the inner harbour is finite and under some in combination scenarios such as extreme tides, storm surges, pluvial events, then free discharge from Pow Beck can be affected. Tide-locking can end up backing-up surface water drainage outfalls causing surcharging of culverts and manholes. Sea level rise as a result of climate change will lead to an increase the risks of tide-locking in the future.

The LPA advocates an investigation by the EA into the possibility of Whitehaven being designated a ACDP in future. Whitehaven is not currently a priority location according to the EA, which has no intention to designate a ADCP as the risk areas are located in Flood Zone 3, in an Area Benefitting from Defences (ABD) or in Flood Zone 2 upstream.

Millom is another town in Copeland that CBC confirms is highly susceptible to surface water flooding due to, as with Whitehaven, the drainage system being severely under capacity. The drainage system in the town is of a 1 in 30 AEP standard meaning any flood event greater than this will cause the system to surcharge. Again, dewatering may be a solution.

As with fluvial and tidal flood risk, historic surface water flood data is also useful in determining high risk areas. The EA, the LLFA and United Utilities (UU) provided historic data for this SFRA. Appendix A shows the RoFSW and incidents of historic surface water flooding.

According to the LFRMS, many settlements in Cumbria are vulnerable to flooding from runoff from the steep high catchments above them, frequently containing vast areas of agricultural land and semi-natural habitat which speeds the flow into the river channels. This rapid runoff increases the peak flow of flood waters and may increase the risk of flooding further downstream. The LFRMS states that *"Cumbria County Council will work closely with the Natural England, National Farmers Union and land management specialists such as the Cumbria Peat Partnership and Cumbria Wildlife Trust, as well as the landowners themselves to restore habitats and identify solutions to reduce surface water flood risk to these communities".*

4.2.1 Critical Drainage Areas

Volume I explains the difference between EA designated Areas with Critical Drainage Problems (ACDPs) and council designated Critical Drainage Areas (CDAs). There are no ACDPs present in Copeland, however there are two CDA boundaries, delineated through the 2012 SWMP, in Whitehaven, one covering the town centre and one covering Moresby Parks.

The SWMP justification for both areas is as follows:

"*the topography and geology of Whitehaven results in an extensive area of flood risk from surface water and sewer system along the Pow Beck Valley. This area would be sensitive to any additional flows as a result of future development. Urban extents and hydraulic boundaries have formed the CDA boundary".*

The SWMP also advises that…

"…any future development in the Kells/Woodhouse/Marchon area should drain west, to the sea or via an attenuated system to Rottington Beck to the south, disposal of surface water to the combined or foul sewer network should be prevented, and upstream storage options on larger watercourses should be investigated by the LLFA".

The LLFA should initially assess the Natural Flood Management (NFM) / Working with Natural Processes (WwNP) datasets, discussed in Volume I, regarding the final point concerning upstream storage options. These datasets are also included on the SFRA Maps in Appendix A.

Neither the LPA nor the LLFA have designated a CDA in Millom, however, due to the level of surface water flood risk in this area, the EA recognises Millom to be significantly vulnerable to surface water flooding, as discussed in Section 4.3 and 4.5.

It is therefore recommended for Millom to be a designated CDA in the short term future, see Table 6-1: Recommended further work for the LPA / LLFA**. However, the LPA needs to formulate some policy to go with the CDAs.**

At the time of writing, CBC has no immediate plans to introduce specific policy on CDAs. However, it is acknowledged that this requires discussion between CCC as the LLFA and the LPA. CBC is open to considering stricter policy requirements for CDAs, particularly whilst in the process of producing the new Local Plan. Current CBC Development Management approach is to accept the judgement of CBC's Flood and Coastal Engineer and the LLFA's consultation responses to individual planning applications.

4.3 Groundwater flooding

As discussed in Volume I, the EA's national dataset, Areas Susceptible to Groundwater Flooding, uses four susceptibility categories to show the proportion of a network of 1 km grid squares where geological and hydrogeological conditions show that groundwater may emerge.

According to the AStGWF dataset, the towns of Egremont, south Whitehaven and north Millom have high potential for groundwater emergence to occur at the surface. This dataset however is coarse scale and according to the 2007 SFRA, groundwater can and does occur throughout the borough and cannot always be predicted. However, it is important to ensure that future development is not placed at unnecessary risk therefore groundwater flood risk should be considered on a site by site basis in development planning.

4.4 Canal and reservoir flood risk

4.4.1 Canals

There are no canalised waterways within the Copeland Borough.

4.4.2 Reservoirs

According to the EA's Reservoir Flood Map (RFM), referred in Volume I, there are no 'large reservoirs' directly located within the boundaries of the Copeland LPA area. However, there is Ennerdale Water located within the LDNP, upstream of Cleator Moor and Egremont, which, given dam failure or overtopping, could impact on downstream communities such as Cleator, Egremont and Braystones, according to the RFM. Ponsonby Tarn is located completely within the Copeland borough, and Gatehouse Tarn (Eskdale Green) which is located within the LDNP. The reservoir locations can be seen on the OS basemaps of the SFRA Maps in Appendix A. Developers should consult the RFM online when carrying out FRAs.

Whilst large reservoirs provide the obvious source of residual risk (breaching/overtopping) from artificial sources, there could potentially be residual risk from a number of smaller waterbodies within Copeland or upstream in the LDNP, Allerdale or South Lakeland. It is considered that smaller reservoirs generally pose less of a risk than larger reservoirs because they hold less water, although there is evidence that a minority of smaller reservoirs could pose a risk in certain circumstances[22]. Smaller waterbodies may have potential ownership issues resulting in a lack of regular inspections and sometimes poor embankment conditions. This may increase the residual risk of breaching or overtopping compared to the large reservoirs which are maintained by UU.

4.5 Historical flooding

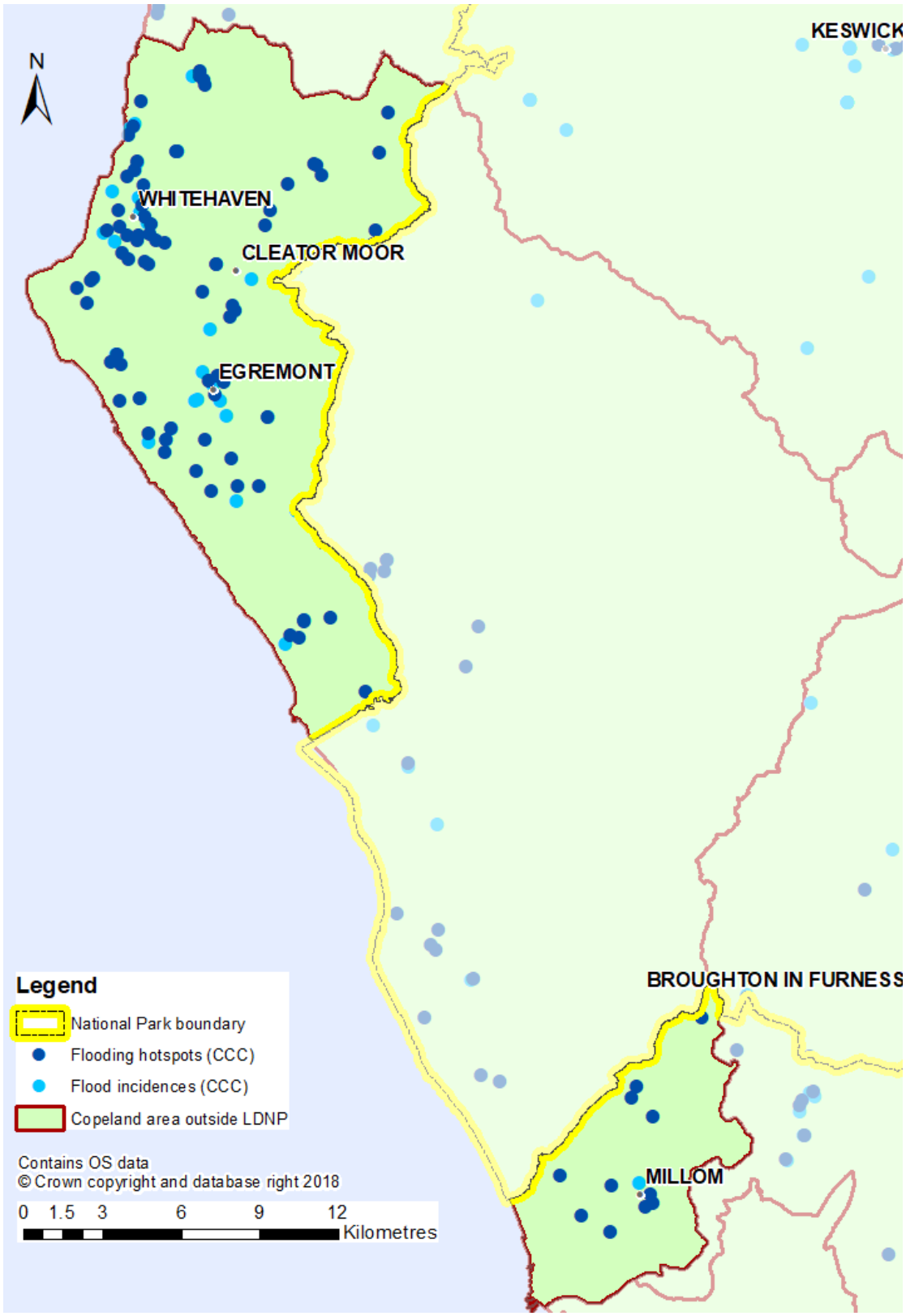
Records of past flooding are vital to understanding flood risk so it can effectively be managed. Section 3.4.2 provides accounts of several major flood events that have occurred in Copeland for which Flood Investigation Reports were created. This section discusses other notable historic flood incidents that are known to have occurred within Copeland. Figure 4-1: CCC historic flood incident registershows CCC's historic flood incident register and its flood Hotspots dataset which, as discussed in Volume I, includes multiple sources of flooding. There is visible clustering of incidents around the larger settlements of Egremont and Whitehaven. As LLFA, CCC is required, under the FWMA, to maintain and update its flood incident database as and when any flood incidents occur.

At the time of writing, the historic flood incident register includes 400 flood incidents of multiple sources and 291 flood Hotspots across the four LPAs since 2005 to December 2017. A number of the flood incidents include flooding of multiple properties, gardens, highways and footpaths with the majority having occurred in December 2015 coinciding with Storm Desmond. Of the 400 recorded flood incidents, there are 35 across Copeland, outside of the LDNP, and 86 hotspots, again outside of the LDNP.

The recorded flood incidents include flooding of property, gardens to property, highways and footpaths. Many of these incidents are at the property level and as such are considered as sensitive information, and have therefore not been included on the detailed large scale SFRA Maps. They are however shown at the smaller scale for Copeland in Figure 4-1Figure 4-1: CCC historic flood incident register. The CBC PFRA also summarises historical flood events that have occurred across the Borough.

22 Reservoir Safety, Defra, February 2015

Figure 4-1: CCC historic flood incident register



On 30th September 2017, the town of Millom suffered severe flooding due to both fluvial flooding form ordinary watercourses and the surcharging of the drainage systems causing surface water flooding at the same time.

The 2007 SFRA for Copeland states that the borough has a considerable history of flooding with significant events (resulting in property flooding) occurring at several locations on a number of occasions. In 1999 a prolonged intense storm flooded 150 properties in Whitehaven and 30 properties in Egremont respectively. Distington and Cleator Moor were also badly affected during this same event. Approximately 8 mm of rain an hour fell between 00:00hrs and 10:00hrs in the upper Ehen catchment and in Ennerdale. The Keekle catchment had an average rainfall of 25mm an hour, peaking between 06:30hrs and 08:00hrs where 47 mm fell in 90 minutes. The combination of rainfall in these two areas caused extensive flooding to Egremont. Lambhill Gill caused flooding of property at Parton in 2004 and 2006 due to culvert blockage which may have been caused by material from the upstream quarry. Distington Beck caused flooding of properties at Lowca in 2004.

The flood extents for historical river and tidal flooding events were provided by the EA and the Council. These outlines are limited in their usefulness for SFRA purposes as the magnitude of the mapped event is not known with a great deal of accuracy. They provide a good depiction of known flood risk areas within the Borough however, and have been used to review the delineation of the adopted flood risk zones

Table 4-1 Locations in Copeland with a history of flooding (non-tidal) from CFMP[23]

Location	Watercourse	Last Major Event	Recorded incidents
Egremont	River Ehen and Skirting Beck	October 2005	2 since 2004
Various along Distington Beck	Distington Beck	October 2004	5 since 1975
Cleator	River Ehen	November 2000	1 known
Braystones and Beckermet	Kirk/Black Beck and River Ehen	December 1999	2 since 1979
Cleator Moor	Nor and Bowthorn Beck	December 2007	2 since 1999
Whitehaven and Mirehouse	Pow Beck	November 1999	3 in 1999 - no previous history found

4.5.1 Historical fluvial / tidal

There have been a number of fluvial food events in recent years, but due to the rural nature of the South West Lakes catchment, damage to property and infrastructure in Copeland has not been as extensive as it could have been. Western and southern areas of the catchment regularly experience tidal flooding. The majority of flooding in the South West Lakes catchment is caused by localised intense rainfall which leads to flash flooding during the summer months or prolonged periods of heavy rain during the autumn/winter.

Table 4-2 Historical flood events affecting 30 or more properties in a single location. Number of properties affected shown in brackets[24]

Tidal floods	
1997	Dispersed locations along the Cumbrian Coast, Lancashire Coast (~100)

Fluvial Floods (from 'main river'):	
2012	Egremont (69)
1999	Egremont (61), Cleator Moor (51)
1977	Egremont (36)

23 Environment Agency South West Lakes Catchment Flood Management Plan August 2008

24 Flood Risk Management Plan 2015-2021. 2016. Part A. North West river basin district

4.5.2 Historic surface water flooding

The geography and topography of Cumbria means the county has high annual rainfall, shallow soils and steep hillslopes. Rainwater can therefore run off the land very quickly resulting in flashy watercourses, sheet flow where rain water runs directly off the land without entering a watercourse. Drainage systems therefore become overwhelmed, and impermeable surfaces assist in increased surface water runoff accumulation.

There are over 35,000 people at high risk (up to a 1 in 30 chances in any given year) of flooding from surface water within the North-West river basin district, compared with 31,000 from rivers and the sea. Surface water tends to be more of an issue within urban areas where there are more impermeable surfaces and artificial drainage networks. This can also be the case with smaller semi-rural settlements which can also be significantly affected by surface water flooding. Examples include much of flooding to villages and urban fringes in Cumbria in 2009, 2012 and 2015.

Data collected for the LLFA's Preliminary Flood Risk Assessment (PFRA) in 2011 revealed over 250 past flood incidents across Cumbria, provided by local authority records. In addition, interrogation of the UU Sewer Incident Record System (WIRS/SIRS) database uncovered a further 250 incidents of flooding due to the sewer system capacity being exceeded. The majority of these incidents related to flooding of minor roads or single properties. Table 4-3 presents the outcomes of a UU assessment of the drainage networks of Whitehaven, Millom and Egremont, being the settlements with the highest number of recorded surface water flood incidents at the time. This assessment backs up with what is discussed in Section 4.2.1 and reinforces the designation of the Whitehaven and Moresby Parks CDA.

Table 4-3 An assessment by UU of local drainage capacity, providing information in relation to the state of the sewer capacity in Copeland in 2011[25]

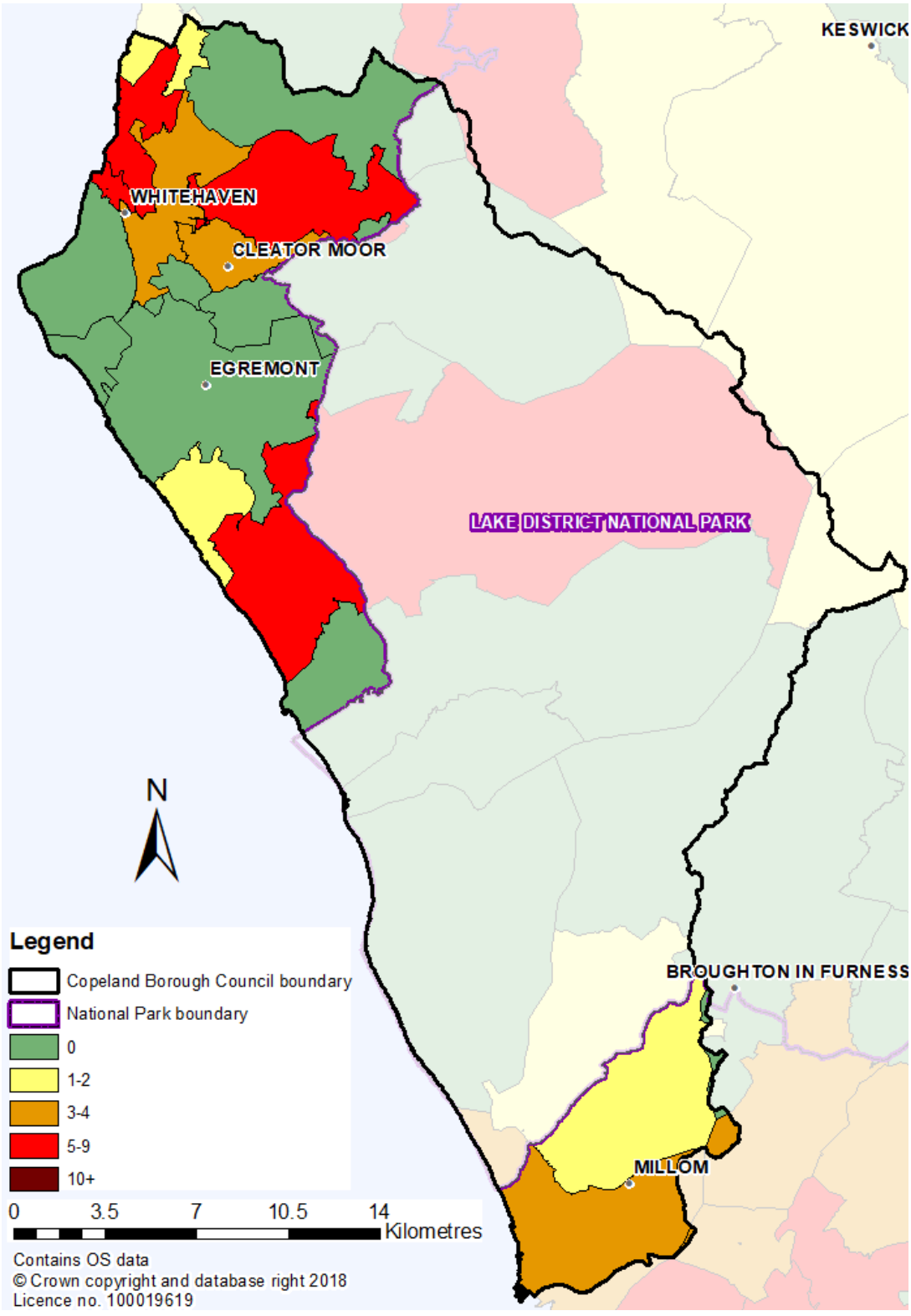
Location	Sewer model	UU comment on capacity
Whitehaven	Y	Tide locking in Parton and combination problems in Pow Beck Valley
Millom	Y	No specific issues
Egremont	Y	UU has re-sewered Egremont

According to the PFRA, Whitehaven and Parton, in 2011, had the highest number of historical incidents reported in Copeland. Flooding from an Ordinary Watercourse was experienced in Parton, a coastal village north of Whitehaven, in October 2014. Inlet capacity issues on a culverted section of the watercourse resulted in a flow route being established across agricultural land towards the village of Parton. The flow route through the village resulted in over 20 properties being flooded at varying depths.

Figure 4-2 shows the number of historic sewer flooding events of properties per postcode area with the worst affected postcode area in Copeland shown in orange. This area covers the north of Whitehaven.

25 Cumbria Area Preliminary Appraisal Report 2011. Preliminary Flood Risk Assessment. Flood Risk Regulations 2009.

Figure 4-2 UU historic flood data by postcode area



4.5.3 EA Historic Flood Map

The Historic Flood Map (HFM) contains outlines showing the maximum extent of recorded past fluvial, tidal and groundwater flood events though does not contain any information regarding flood source, return period or date of flooding. There are three significant areas within the HFM in the

Borough, shown on the SFRA Maps in Appendix A. These are on the Ehen at Cleator Moor and Egremont, and at several locations around Whitehaven.

The Recorded Flood Outlines (RFO) dataset includes outlines detailing EA records of flooding from rivers and sea, groundwater and surface water. There are a significant number of RFOs, particularly within the north of Copeland, outside the LNDP. There are three significant areas within the RFO in the borough, namely Whitehaven, Cleator Moor and Egremont. Braystones and Beckermet have also suffered from flooding in Copeland.

Five of these outlines detail flood events in Cleator Moor from October 2005, attributable to surface water flooding from sewers; November 2009 which lasted for three days and was a result of both surface water flooding from sewers and fluvial flooding from the River Ehen; and the August 2017 flood event which was caused by local drainage surcharging and surface water flooding.

Whitehaven has suffered from historic flooding in 1999, 2000, 2006, 2007 and August 2017. The majority of the flood events in the town were attributable to local drainage or surface water issues, according to the RFO. However, Egremont has the greatest number of recorded historic flood events, with seven events recorded since records began in 1946. The vast majority of these events, in 2000, 2005, 2008, 2009 (August and November), are a result of fluvial flooding due to channel capacity exceedance of the River Ehen and Skirting Beck. The August 2012 event however, was attributable to surface water flooding, and the cause of flooding for events in 1999 and 2000 are unknown.

4.6 Flood Risk Management

The aim of this section of the SFRA is to identify existing Flood Risk Management (FRM) assets and previous / proposed FRM schemes that may affect the Borough. The location, condition and design standard of existing assets will have a significant impact on actual flood risk mechanisms. Whilst future schemes in high flood risk areas carry the possibility of reducing the probability of flood events and reducing the overall level of risk. Both existing assets and future schemes will have a further impact on the type, form and location of new development or regeneration.

4.6.1 EA assets

The EA holds and maintains a spatial flood defence GIS dataset which shows that there are several major flood walls and embankments located within the Borough. The dataset shows that, in total, there are 93 flood defence assets within Copeland, outside of the LDNP. Table 4-4 highlights the main towns within Copeland that have significant FRM assets, the majority of which are in Millom. Millom, on the north shore of the estuary of the River Duddon, is prone to flooding due to the natural topography of the area.

Millom has the highest proportion of major flood defence assets in Copeland with 42 asset features, 12 of which are floodwalls and 30 are flood embankments. Millom's defences have a design standard range of 10-100 and condition range of 2-4, however the majority of flood defences have a design standard of 100 and therefore could be described as providing a 1 in 100-year standard of protection. The most common condition associated with Millom's defences is 3, which is considered 'Fair' according to the EA's Condition Assessment Manual (CAM) (as discussed in Volume 1), with defences having 'defects that could reduce the programme of the asset'.

There are fluvial/tidal flood embankments on the right bank of the River Duddon as it enters the Duddon estuary. These embankments continue along the estuary to protect the surrounding areas and Millom from fluvial and tidal flooding. There are 6 flood walls on the left and right bank of Black Beck, however these defences all have a condition of 4 and therefore have 'defects that would significantly reduce the performance of the asset. Further investigation needed'. Therefore, the reliability of these defences is questionable.

Braystones has a large flood embankment constructed along the River Ehen, with a design standard range of 10-50 and condition grades between 3-5.

There are fluvial flood defences in Cleator Moor, with a design standard range of 5-100 and conditions between 2-4 protecting Cleator Moor from fluvial flooding from the River Ehen.

Whitehaven Marina has a large coastal wall which is expected to provide a 1 in 200-year standard of protection, with a condition of 3 and is therefore vital in protecting the settlements within Whitehaven.

Areas Benefitting from Defences (ABD)

There are also a number of ABD's within Copeland, located to the west of Duddon Estuary, North of Millom and are protected by approximately 11 km of tidal embankment flood defence assets along the Duddon Estuary coast, including the Millom, Ladyhall and Duddon embankments. Areas that Benefit from Defences are north of Millom and include areas such as; Burnfield, The Hill, Low and High Shaw and Holme Farm for example.

Where development is proposed in undefended areas, outside of the functional floodplain, there may be implications associated with any plans for land raising which could possibly reduce compensatory flood storage. For any development within a defended flood risk area, residual risk will need to be taken into consideration as this may have a significant impact on the risk to residential and commercial properties. Any new development behind flood defences can increase the residual risk of flooding if overtopping or breaching occurs by changing the conveyance of the flow paths or by displacing water elsewhere. Compensatory storage may be required to offset any loss of flood storage capacity.

Table 4-4 Major flood walls and embankments in the main settlements

Settlement	Asset Features	Asset Type	Flood source	Watercourse	Design standard	Condition
Millom	42	30 Embankment 12 Wall	Fluvial/ Tidal/ Coastal	Duddon Channel/ Black Beck/ Haverigg Pool	Unknown (1) 20 (4) 30 (1) 50 (3) 70 (5) 100 (27) 150 (1)	2 (6) 3 (31) 4 (5)
Egremont	13	6 Embankment 7 Wall	Fluvial	River Ehen	Unknown (5) 10 (3) 20 (2) 50 (2) 75 (1)	1 (1) 2 (5) 3 (4) 4 (2)
Braystones	9	9 Embankment	Fluvial	River Ehen	10 (7) 50 (2)	3 (2) 4 (5) 5 (2)
Cleator Moor	6	6 Embankment	Fluvial	River Ehen	5 (1) 50 (2) 100 (3)	3 (2) 4 (4)
Whitehaven	4	2 Embankment 2 Wall	Fluvial/ Coastal	Pow Beck/Midgey Gill	20 (3) 200 (1)	2 (2) 3 (2)

4.6.2 LLFA/CBC Assets

The LLFA/CBC will own and maintain a number of assets throughout the authority area which will include culverts, bridge structures, gullies, weirs and trash screens. The majority of these assets will lie along ordinary watercourses within smaller urban areas where watercourses may have been culverted or diverted, or within rural areas.

All these assets can have flood risk management functions as well as an effect on flood risk if they become blocked or fail. However, in most cases responsibility lies with the riparian / land owner.

As part of its FWMA duties, the LLFA has a duty to maintain a register of structures or features, which are considered to have a significant effect on flood risk, including details on ownership and condition as a minimum. The Asset Register should include those features relevant to flood risk management function including feature type, description of principal materials, location, measurements (height, length, width, diameter) and condition grade. The Act places no duty on the LLFA to maintain any third-party features, only those for which the authority has responsibility as land/asset owner.

The LLFA should carry out a strategic assessment of structures and features on the FRM Asset Register to inform capital programme and prioritise maintenance programme. Critical assets (i.e. culverts in poor condition) should be prioritised for designated works.

4.6.3 EA Flood Risk Management Activities and Flood and Coastal Erosion Risk Management Research and Development

As well as the ownership and maintenance of a network of formal defence structures, the EA carries out a number of other flood risk management activities that help to reduce the probability of flooding, whilst also addressing the consequences of flooding. These include:

- Maintaining and improving existing flood defences, structures and Main River channels.
- Enforcement and maintenance where riparian owners unknowingly carry out work that may be detrimental to flood risk.
- Identifying and promoting new flood alleviation schemes (FAS) where appropriate.
- Working with local authorities to influence the location, layout and design of new and redeveloped property and ensuring that only appropriate development is permitted relative to the scale of flood risk, i.e. through this SFRA.
- Operation of Floodline Warnings Direct and flood warning services for areas within designated Flood Warning Areas (FWA) or Flood Alert Areas (FAA). EA FWAs are shown on the SFRA Maps in Appendix A.
- Incident management - deploying response teams and equipment in line with agreed emergency plans
- Promoting awareness of flooding so that organisations, communities and individuals are aware of the risk and are therefore sufficiently prepared in the event of flooding.
- Promoting resilience and resistance measures for existing properties that are currently at flood risk, or may be in the future as a result of climate change.

The Flood and Coastal Erosion Risk Management (FCERM) Research and Development programme is run by the EA and Defra and aims to serve the needs of all flood and coastal operating authorities in England. The programme provides the key evidence, information, tools and techniques to:

- Inform the development of Flood and Coastal Erosion Risk Management (FCERM) policy and strategy.
- Understand and assess coastal and flood risks and the processes by which these risks arise.
- Manage flood and coastal erosion assets in a sustainable way.
- Prepare for and manage flood events effectively.

Based on information publicly available from the EA, there are a number of completed, ongoing and proposed national flood risk management work programmes. Follow the link below for the latest news where there may be programmes relevant to the Copeland authority area:

http://evidence.environment-agency.gov.uk/FCERM/en/Default/FCRM.aspx

4.6.4 Future Flood Risk Management Work Programmes

Based on information publicly available from the EA, there are a number of ongoing and proposed flood risk management work programmes in the district. In the Flood and Coastal Erosion Risk Management (FCERM) Development Programme, the following locations are included for flood risk management works:

- Fairways, Seascale Attenuation Scheme (April 2017-April 2019)
- Gosforth, West Cumbria (2017-2021)
- Moresby Watercourse investigation (2019-2021+)
- Parton fluvial and surface water flooding investigation (2017-2021)
- Ravenglass, Cumbria (2017-2021)

- Skirting Beck, Egremont (2017-2019)
- Whitehaven Coastal Erosion and Flooding Protection (2019-2021).

An appraisal of the Whitehaven Coastal Erosion and Flooding Protection scheme found that there was no justification for Grant in Aid (GiA) for assets put at risk from coastal flooding resulting from the rapid erosion of colliery waste tipped at Whitehaven South Beach. Only part of the west pier of Whitehaven harbour was considered at risk from storm damage and overtopping.

4.7 Flood Warning Areas and Flood Alert Areas

Volume I discusses Flood Warning Areas (FWA) and Flood Alert Areas (FAA). In total, there are 14 FWAs within Copeland, outside of the LDNP. Six of these are large scale FWAs that run along the whole length of the western coastline, which continue from Silloth to St Bees including Whitehaven, St Bees Head to Millom and from the Cumbrian coastline to the Duddon Estuary.

There is currently a total of six FAAs within Copeland, outside of the LNDP. The FWAs mentioned above are also considered to be three FAAs within the area. The additional three FAAs are included within the Rivers Cocker, Marron and Derwent FWA, Rivers Duddon, Crake and Mill Beck FWA and Rivers Ehen, Calder, Irt and Esk FWA.

Kirk Beck and Back Beck at Beckermet; Newmill Beck; Rottington Beck; Ellergill Beck; Pow Beck (from Whitehaven to Mirehouse West, continuing from the confluence with Scalegill Beck, heading south to the western coastline to enter the Irish Sea), are all watercourses with FAAs within the 'Rivers Ehen, Calder, Irt and Esk FWA'.

There are five FWAs in Egremont surrounding the River Ehen and its confluence with Skirting Beck where it joints at a large meander. A number of properties in Whitehaven Town Centre are within a FWA and the village of Braystones is also covered by FWAs to ensure protection for the properties adjacent to the River Ehen at Low Mill. There are two FWAs in Millom which cover a large area along the western Coastline at the Duddon Estuary. These areas cover Haverigg, Arnaby Marsh, Foxfield Farm, Sandside, Dunnerholme, Port Haverigg Holiday Village and Millom Marsh.

The FWAs and FAAs are shown on the SFRA Maps in Appendix A.

5 Development and Flood Risk

5.1 Introduction

This section of the SFRA provides a strategic assessment of the suitability, relative to flood risk, of the potential development sites to be considered though the Local Plan.

The information and guidance provided in this chapter (also supported by the SFRA Maps in Appendix A and the Development Site Assessment spreadsheet in Appendix B) can be used by the LPA to inform its Local Plan, and provide the basis from which to apply the Sequential Approach in the development allocation and development management process.

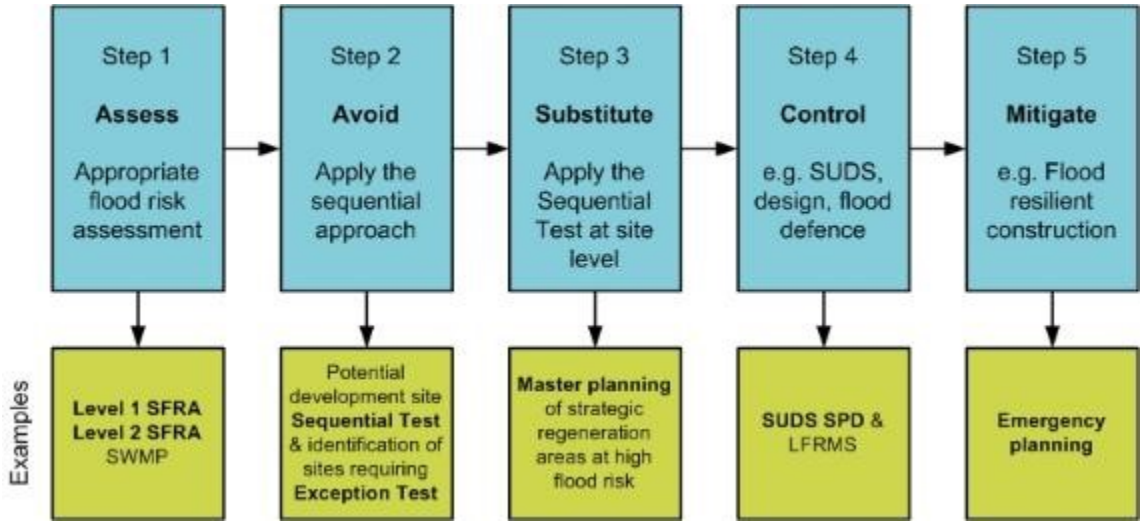
5.2 The Sequential Approach

The FRCC-PPG provides the basis for the Sequential Approach. It is this approach, integrated into all stages of the development planning process, which provides the opportunities to reduce flood risk to people, property, infrastructure and the environment to acceptable levels.

The approach is based around the flood risk management (FRM) hierarchy, in which actions to avoid, substitute, control and mitigate flood risk is central. For example, it is important to assess the level of risk to an appropriate scale during the decision-making process, (starting with this Level 1 SFRA). Once this evidence has been provided, positive planning decisions can be made and effective FRM opportunities identified.

Figure 5-1 illustrates the FRM hierarchy with an example of how these may translate into the LPA's management decisions and actions.

Figure 5-1: Flood Risk Management hierarchy



Using the EA's Flood Map for Planning, the overall aim of the Sequential Approach should be to steer new development to low risk Flood Zone 1. Where there are no reasonably available sites in Flood Zone 1, the flood risk vulnerability of land uses and reasonably available sites in Flood Zone 2 should be considered, applying the Exception Test if required.

Only where there are no reasonably available sites in Flood Zones 1 or 2 should the suitability of sites in higher risk Flood Zone 3, be considered. This should take into account the flood risk vulnerability of land uses and the likelihood of meeting the requirements of the Exception Test if required.

There are two different aims in carrying out the Sequential Approach depending on what stage of the planning system is being carried out i.e. LPAs allocating land in Local Plans or determining planning applications for development. This SFRA does not remove the need for a site-specific Flood Risk Assessment at a development management stage.

The following sections provide a guided discussion on why and how the Sequential Approach should be applied, including the specific requirements for undertaking Sequential and Exception Testing.

5.3 Local Plan Sequential & Exception Test

The LPA, should seek to avoid inappropriate development in areas at risk of flooding by directing development away from areas at highest risk and ensuring that all development does not increase risk and where possible can help reduce risk from flooding to existing communities and development.

At a strategic level, this should be carried out as part of the LPA's Local Plan. This should be done broadly by:

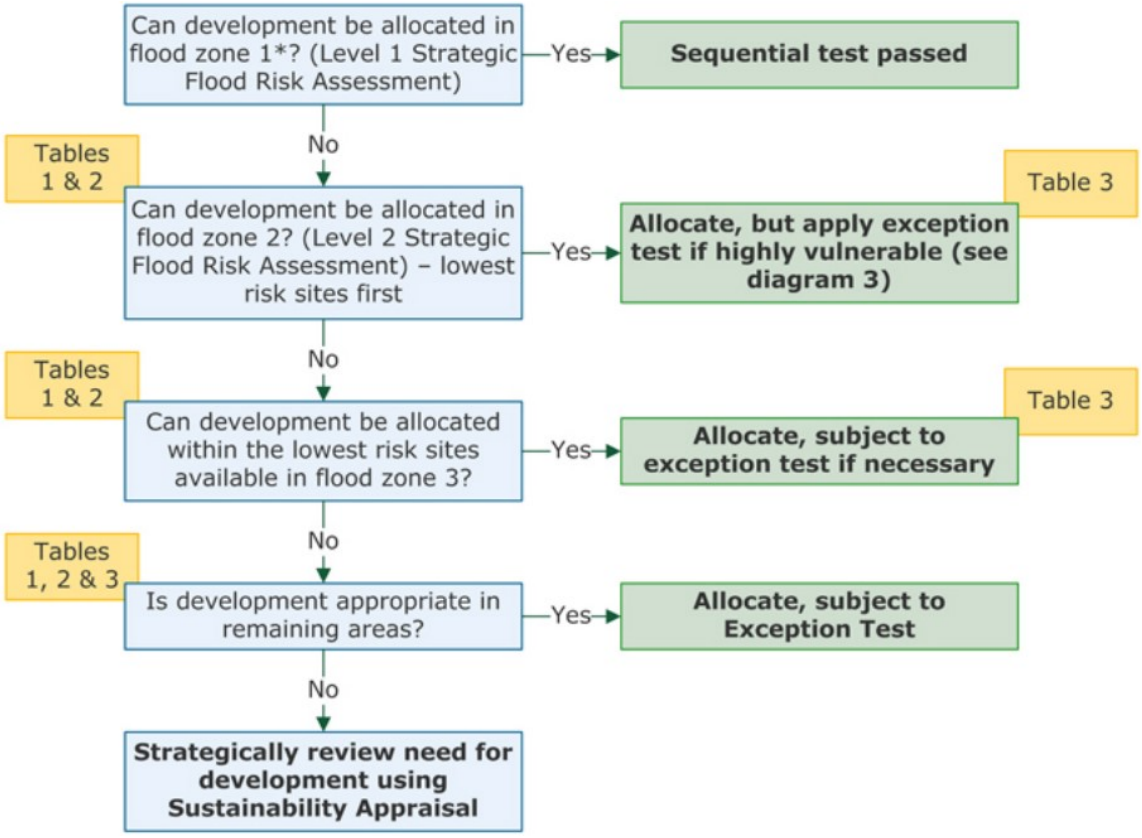
1. Applying the Sequential Test and if the Sequential Test is passed, applying the Exception Test, if required;
2. Safeguarding land from development that is required for current and future flood management;
3. Using opportunities offered by new development to reduce the causes and impacts of flooding;
4. Identifying where flood risk is expected to increase with climate change so that existing development may not be sustainable in the long term;
5. Seeking opportunities to facilitate the relocation of development including housing to more sustainable locations.

Figure 5-2 illustrates the Sequential and Exception Tests as a process flow diagram using the information contained in this SFRA to assess potential development sites against the EA's Flood Map for Planning flood zones and development vulnerability compatibilities.

This is a stepwise process, but a challenging one, as a number of the criteria used are qualitative and based on experienced judgement. The process must be documented and evidence used to support decisions recorded.

This can be done using the Development Site Assessment spreadsheet in Appendix B. This spreadsheet will help show that the LPA, through this SFRA, has applied the Sequential Test for sites at fluvial and tidal risk and also considered surface water flood risk in equal standing and thus considered development viability options for each potential development site.

Figure 5-2: Local Plan sequential approach to site allocation[26]



*Other sources of flooding also need to be considered

(Tables 1, 2, 3 refer to the Flood Zone and flood risk tables of the FRCC-PPG Paragraphs 065-067).

The approach shown in Figure 5-2 provides an open demonstration of the Sequential Test being applied in line with the NPPF and the FRCC-PPG. The EA works with local authorities to agree locally specific approaches to the application of the Sequential Test and any local information or consultations with the LLFA should be taken into account.

This SFRA provides the main evidence required to carry out this process. The process also enables those sites that have passed the Sequential Test, and may require the Exception Test, to be identified. Following application of the Sequential Test the LPA and developers should refer to 'Table 3: Flood risk vulnerability and flood zone 'compatibility" of the FRCC-PPG (Paragraph 067) when deciding whether a development may be suitable or not.

For the Exception Test to be passed, the NPPF Paragraph 102 states:

a. *"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*
b. *A site-specific Flood Risk Assessment (FRA) 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.*

Both elements of the test will have to be passed for development to be allocated or permitted".

26 https://www.gov.uk/guidance/flood-risk-and-coastal-change#Sequential-Test-to-Local-Plan

Although passing the Exception Test will require the completion of a site-specific FRA, the LPAs should be able to assess the likelihood of passing the test at the Local Plan level by using the information contained in this SFRA to answer the following questions:

a. Can development within higher risk areas be avoided or substituted?

b. Is flood risk associated with possible development sites considered too high; and will this mean that the criteria for Exception Testing are unachievable?

c. Can risk be sustainably managed through appropriate development techniques (resilience and resistance) and incorporate SuDS without compromising the viability of the development?

d. Can the site, and any residual risks to the site, be safely managed to ensure that its occupiers remain safe during times of flood if developed?

To fully answer questions b to d, further, more detailed assessment may be required through a Level 2 SFRA.

Where it is found to be unlikely that the Exception Test can be passed due to few wider sustainability benefits, the risk of flooding being too great, or the viability of the site being compromised by the level of flood risk management work required, then the LPA should consider avoiding the site altogether.

Once this process has been completed, the LPA should then be able to allocate appropriate development sites through its Local Plan as well as prepare flood risk policy including the requirement to prepare site-specific FRAs for all allocated sites that remain at risk of flooding or that are greater than one hectare in area.

5.4 Local Plan sites assessment

CBC provided its undeveloped sites identified for housing, employment, mixed use (residential and employment) and community gardens. The CBC Full Council approved many of these sites in 2013 as part of its allocation of Land Policies. This does not include sites identified in the 2016 CBC extension areas. An additional 56 sites, proposed for housing, were provided for assessment by CBC in January 2018 after a proactive search for additional new sites suitable for housing following the announcement in May 2017 that the Council could not demonstrate a five year housing land supply".

. A total of 317 potential development sites have been assessed for flood risk through this SFRA.

Table 5-1 Proposed site uses and flood risk vulnerability

Proposed site use	Flood risk vulnerability (Table 2 of FRCC-PPG)
Residential	More vulnerable
Employment	Less vulnerable
*Mixed use	More vulnerable
**Community Garden	Water compatible
***May also contain some element of residential use, hence the more vulnerable category**	
****Based on the FRCC-PPG Table 2 definition: amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms**	

In order to inform the Sequential Approach for allocation of development through the Local Plan (as illustrated in Figure 5-2), this SFRA has carried out a high-level GIS screening exercise overlaying the allocated sites against Flood Zones 1, 2, 3a and 3b and calculating the area of each site at risk. Flood Zones 1, 2 and 3a are sourced from the EA's Flood Map for Planning (Rivers and Sea) and Flood Zones 3b (functional floodplain) was delineated as part of this SFRA. Surface water risk to potential sites is assessed by way of the EA's Risk of Flooding from Surface Water (RoFSW). Results are presented in the Development Site Assessment spreadsheet.

As discussed in Volume I, not all watercourses in Cumbria have been modelled by the EA to include the updated peak river flow allowances, at the time of this SFRA. This is the case for the main rivers in Copeland, therefore, the precautionary approach to future risk has been adopted whereby Flood Zone 2 of the EA's Flood Map for Planning is used as a climate change proxy for the future extent of Flood Zone 3 in 100 years' time. See Section 5.6.

5.5 Screening of potential development sites

This section of the report draws together the results included in the Development Sites Assessment spreadsheet (Appendix B), produced from the GIS screening exercise. The LPA should use the spreadsheet to identify which sites should be avoided during the Sequential Test. If this is not the case, or where wider strategic objectives require development in areas already at risk of flooding, then the LPA should consider the compatibility of vulnerability classifications and Flood Zones (refer to FRCC-PPG) and whether or not the Exception Test will be required before finalising sites. The decision-making process on site suitability should be transparent and information from this SFRA should be used to justify decisions to allocate land in areas at high risk of flooding.

The Appendix B spreadsheet provides a breakdown of each site and the area (in hectares) and percentage coverage of each fluvial / tidal flood zone and each surface water flood zone. Fluvial / tidal Flood Zones 3b, 3a, 2 and 1 are considered in isolation. Any area of a site within the higher risk Flood Zone 3b that is also within Flood Zone 3a is excluded from Flood Zone 3a and any area within Flood Zone 3a is excluded from Flood Zone 2. This allows for the sequential assessment of risk at each site by addressing those sites at higher risk first. The same approach applies to the surface water flood zones. Table 5-2 shows the number of sites within each fluvial / tidal flood zone and Table 5-3 shows the number of sites within each surface water flood zone.

Table 5-2 Number of potential development sites at risk from fluvial /tidal flooding

Potential development Site	Number of sites within… Flood Zone 1*	Flood Zone 2	Flood Zone 3a	Flood Zone 3b
Residential	214	29	26	11
Employment	27	13	6	3
Mixed use	15	9	8	3
Community garden	2	0	0	0
Total	**256**	**51**	**40**	**17**
*Sites with 100% area within Flood Zone 1				

Table 5-3 Number of potential development sites at risk from surface water flooding

Potential development Site	RoFSW flood zone Low risk (1 in 1000)	Medium risk (1 in 100)	High risk (1 in 30)
Residential	159	109	83
Employment	32	25	21
Mixed use	18	14	11
Community garden	2	0	0
Total	**209**	**148**	**115**

The spreadsheet also includes high level broad-brush strategic recommendations on the viability of development for each site. Development viability is assessed, based on Tables 1, 2 and 3 of the flood risk and flood zone tables[27] of the FRCC-PPG (Paragraphs 065 - 067). The strategic recommendations are intended to assist the LPA in carrying out the Sequential Test and to

27 https://www.gov.uk/guidance/flood-risk-and-coastal-change#flood-zone-and-flood-risk-tables

highlight those sites at greatest flood risk. It is important to reiterate that surface water flood risk is afforded the equivalent level of importance as fluvial and tidal risk in terms of the strategic recommendations assigned to each potential development site. Table 5-4 shows the number of sites each strategic recommendation applies to.

Strategic recommendations:

- Strategic Recommendation A - consider withdrawing the site based on significant level of fluvial, tidal or surface water flood risk;
- Strategic Recommendation B - Exception Test required if site passes Sequential Test;
- Strategic Recommendation C - consider site layout and design around the identified flood risk if site passes Sequential Test;
- Strategic Recommendation D - site-specific FRA required; and
- Strategic Recommendation E - site permitted on flood risk grounds due to little perceived risk, subject to consultation with the LPA / LLFA.

Table 5-4 Number of potential development sites that each strategic recommendation applies to

Potential development Site	Strategic Recommendation				
	A	B	C	D	E
Residential	9	7	98	86	51
Employment	0	0	3	33	4
Mixed use	1	1	13	6	3
Community garden	0	0	0	2	0
Total	**10**	**8**	**114**	**127**	**58**

It is important to note that this Level 1 SFRA does not assess each individual site in detail. Each individual site will require further investigation, as local circumstances may dictate the outcome of the strategic recommendation. The strategic recommendation may therefore change upon further investigation.

Such local circumstances may include the following:

- Flood depths and hazards will differ locally to each at risk site therefore modelled depth, hazard and velocity data should be assessed for the relevant flood event outlines, including climate change (using the EA's February 2016 allowances), as part of a site-specific FRA or Level 2 SFRA.
- Current surface water drainage infrastructure and applicability of SuDS techniques are likely to differ at each site considered to be at risk from surface water flooding. Further investigation would therefore be required for any site at surface water flood risk.
- It may be possible at some sites to develop around the flood risk. Planners are best placed to make this judgement i.e. will the site still be deliverable if part of it needs to be retained to make space for flood water?
- Surrounding infrastructure may influence scope for layout redesign/removal of site footprints from risk.
- Safe access and egress must exit at all times during a flood event for emergency response and evacuation
- Current land use. A number of sites included in the assessment are likely to be brownfield, thus the existing development structure could be taken into account as further development may not lead to increased flood risk.
- If sites have planning permission but construction has not started, the SFRA will only be able to influence the design of the development e.g. finished floor levels. New, more extensive flood extents (from new models) cannot be used to reject development where planning permission has already been granted.

- Existing planning permissions may exist on some sites where the EA may have already passed comment and/or agreed to appropriate remedial works concerning flood risk. Previous flood risk investigations/FRAs may already have been carried out at some sites.
- Cumulative effects. New development may result in increased risk to other potential or existing sites. This should be assessed through a Level 2 SFRA or drainage strategy, if required.

The following strategic recommendations provide only a guide, based on the fluvial, tidal and surface water flood risk information made available for this Level 1 SFRA. Information regarding local, site specific information is beyond the scope of this Level 1 SFRA. It is CBC's responsibility to carry out sequential testing of each site using the information provided in this SFRA and more specifically using their local, site specific knowledge and advice from the EA and LLFA. The strategic recommendations should be read alongside the Development Site Assessment spreadsheet in Appendix B, which assists the LPA in carrying out the Sequential Test for each site.

5.5.1 Strategic Recommendation A – consider withdrawal of site

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

Strategic Recommendation A applies to any site where the following criteria is true:

- 10% or greater of the site area is within Flood Zone 3b. The FRCC-PPG flood risk vulnerability classification states that only water-compatible uses and essential infrastructure should be permitted in Flood Zone 3b, though any essential infrastructure must pass the Exception Test and water-compatible uses must be designed and constructed to remain operational and safe for users in times of flood; must result in no net loss of floodplain storage; and not impede water flows and not increase flood risk elsewhere. Development should not be permitted for sites within the highly, more or less vulnerable categories (see Table 5-1) that fall within Flood Zone 3b. If the developer is able to avoid 3b however, then part of the site could still be delivered.
- 10% or greater of the site area of any site type is within the high risk surface water flood outline, and therefore at significant surface water flood risk.
- 10% or greater of the site area of more vulnerable sites are within the medium risk surface water flood outline, and therefore at significant surface water flood risk.

The 10% threshold is not included within any policy, it is merely considered that it may prove difficult for developers to deliver a site where 10% or more of the site area is considered as undevelopable, based on the NPPF. This 10% threshold does not account for local circumstances therefore it may be possible to deliver some of the sites, particularly in larger sites, included with Strategic Recommendation A upon more detailed investigation through a Level 2 SFRA or drainage strategy.

Strategic Recommendation A applies to 10 sites, shown in Table 5-5, due to their location within the functional floodplain or significant surface water flood risk.

Table 5-5: Sites to consider withdrawing from allocation

Site ID	Site name	Proposed use	Site area (ha)	Main source of risk	
SPN123	Land south Haile Bank Farm, Beckermet	Residential	1.54	FZ3b	17.5%
Cl1	Flosh Meadows 1, Flosh Meadows, Cleator	Residential	1.21	RoFSW 100 AEP event	15.1%
Mr1	Station Yard, Moor Row,	Residential	1.52	RoFSW 100 AEP event	10.7%

Site ID	Site name	Proposed use	Site area (ha)	Main source of risk	
Pa3	Whites Row, Parton	Residential	0.44	RoFSW 30 AEP event	32.4%
SPN001	Land to South West of Cleator Mills, Cleator	Residential	0.76	FZ3b	14.3%
SPN015	Land to rear Lamplugh Tip, Lamplugh	Residential	1.49	RoFSW 30 AEP event	10.2%
SPN032	Land at Hinnings Road, Distington	Residential	0.22	RoFSW 30 AEP event	39.7%
SPN037	Land at Main Street, Parton	Residential	0.11	RoFSW 30 AEP event	82.6%
SPN075	Land at Mill Hill, Cleator Moor	Residential	0.37	FZ3b	13.4%
WP3	R	Mixed use	5.70	FZ3b	16.6%

Of the 10 sites that are recommended for withdrawal from allocation, six are based on significant surface water flood risk and four based on their location within Flood Zone 3b. Of the 10, nine are proposed for residential use only and one for mixed uses that entail residential use. Five of the residential sites are under 1 ha in size so would therefore struggle to contain the risk on-site without a significant reduction in housing units or development scale. The mixed use site (WP3) may be large enough, at 5.7 ha, to accommodate Flood Zone 3b (17% of the site area) on-site as amenity green space or car parking for the employment uses. If possible, this site would then be subject to the Exception Test as 21% is within Flood Zone 3a. If Flood Zone 3a could not be avoided, then the employment uses of the site should be directed to the Flood Zone 3a area rather than the more vulnerable residential use.

Any area within Flood Zone 3b must be left as open green space or the site boundary amended to remove the site from the risk area. If this is not possible, the site should be withdrawn. For those at surface water risk, appropriate SuDS must be used to mitigate the risk, preferably, on-site. Section 5.11 details the SuDS options for sites and Figure 5-4 illustrates the hierarchy in terms of SuDS preference. If mitigation through suitable SuDS is not possible, the site should be withdrawn.

Residential site SPN037 would be extremely difficult to develop given the whole site is within Flood Zone 3a and also has 83% of its area at high risk from surface water flooding. Sites SPN032 and Pa3 are at high risk from surface water with nearly 70% of SPN032 within the high and medium risk surface water flood extents. At 0.22 ha in size, this site would struggle to mitigate this risk through SuDS. Site Pa3 has 38% of its 0.44 area within the high and medium risk extents thus effectively reducing its development footprint by up to 40%.

The remaining sites (Cl1, Mr1 and SPN015) are within Flood Zone 1 but at surface water risk. However, upon further investigation, these sites may be large enough to accommodate the risk on-site without impacting too heavily on development expectations. More detailed assessment of site conditions would be required to ascertain whether there are actual surface water flow paths through the sites or whether risk is confined to certain areas in natural depressions. Flood depths and hazards; ground condition assessments for SuDS; and provision for safe access and egress points during a flood would also need to be gauged. A detailed site design and drainage strategy together with a detailed FRA would have to show each site would be safe for its lifetime, which is 100 years for residential.

The EA supports recommendation for withdrawing sites within Flood Zone 3b.

5.5.2 Strategic Recommendation B – Exception Test

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

Strategic Recommendation B applies to sites where it is likely the Exception Test would be required, assuming the Sequential Test has been passed in the first instance. This does not include any recommendation on the likelihood of a site passing the Exception Test. A more in-

depth investigation such as a Level 2 SFRA would be required to assess this. The developer / LPA should always attempt to avoid the risk area where possible.

Strategic Recommendation B applies to sites where the following criteria is true:

- 10% or greater of any more vulnerable site (residential) that is within Flood Zone 3a. Less vulnerable (employment) uses of land do not require the Exception Test and highly vulnerable sites are not permitted in this zone.

NOTE: All development proposals in Flood Zone 3a must be accompanied by a flood risk assessment.

The 10% threshold is not included within any policy; it is merely considered that it may be difficult for developers to avoid Flood Zone 3a when 10% or more of the site area is within it. This 10% threshold does not account for local circumstances therefore it may be possible to avoid Flood Zone 3a altogether for some of the sites included with Recommendation B. It may also be possible to deliver part of some of the larger sites, dependent upon further investigation, where a significant area is not within Flood Zone 3a.

Table 5-6: Sites where application of the Exception Test would be required

Site ID	Site Name	Proposed use	Site Area (ha)	% Area within FZ3a
SPN172	Land south Greenacres, Main Street, Distington	Residential	1.99	15.6
Cl4	Kangol Land, Cleator	Residential	3.82	73.9
MM4	Compound C G Ashburner, Lonsdale Terrace, Millom	Residential	0.15	100.0
MM9	Former Council Depot, Earl street, Millom	Residential	0.18	40.7
SPN020	Land to the East of Moor Moss Lane, Haverigg	Residential	7.65	65.9
SPN021	Port Haverigg Car Centre, Haverigg	Residential	0.52	96.4
SPN050	Land west of Blind Lane, Moor Row	Residential	0.37	96.1
OS2	Pow Beck, Whitehaven	Mixed use	12.49	11.6

Strategic Recommendation B applies to eight potential development sites. **Each of these more vulnerable sites will be subject to and must pass the second part of the Exception Test, assuming they have passed the Sequential Test and the first part of the Exception Test**. Judging from the figures shown in Table 5-6, it is highly unlikely that sites Cl4, MM4, MM9, SPN020, SPN021 and SPN050 would pass the second part of the Exception Test.

The LPA may wish to consider withdrawing these sites at this stage and therefore it is recommended to have pre-application discussions with the EA.

5.5.3 Strategic Recommendation C – consider site layout and design

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

This recommends that, due to only a small proportion of a site being at fluvial or tidal risk, it may be possible that a detailed review of site layout and / or design around the flood risk, as part of a detailed FRA at the development planning stage, may enable development to proceed. Or it may be possible to incorporate suitable SuDS into the site layout to mitigate risk on-site, following a detailed FRA or drainage strategy. A Level 2 SFRA or detailed site-specific FRA would be required to help inform on site layout and design.

Strategic Recommendation C applies to sites where the following criteria is true:

- <10% of the area of any site type is within Flood Zone 3b.
- <10% of any more vulnerable site is within Flood Zone 3a.
- <10% of any more vulnerable site within the high or medium risk surface water flood zone
- 10% or greater of a less vulnerable site within the medium risk surface water flood zone

The 10% threshold is not included within any policy, it is merely considered that it may be possible for developers to avoid Flood Zone 3b and Flood Zone 3a and also the high and medium risk surface water flood zones when less than 10% of the site area is at risk. This 10% threshold does not account for local circumstances.

Where Strategic Recommendation C applies to a potential site, the developer should consider the site layout with a view to removing the site footprint from the flood extent that is obstructing development. If this is not possible then the alternative would be to investigate the incorporation of on-site storage of water into the site design. **Depending on local circumstances, if it is not possible to adjust the site boundary to remove the site footprint to a lower risk zone then this part of the development should not be permitted (for any site in Flood Zone 3b), or the Exception Test should be undertaken and passed as part of a site-specific FRA for the more vulnerable sites within Flood Zone 3a.**

Any site layout and design within 8m of any flood defence structure or culvert on a main river or 16m on a tidal river is likely to be a regulated flood risk activity under Schedule 25 of the Environmental Permitting (England and Wales) Regulations 2016. Site layout and design will have to take this into consideration for development proposals. This easement buffer is recommended by the EA to allow ease of access to watercourses for maintenance works. **Any site redesign, where Flood Zones 3b and 3a, are included within the site footprint, should allow water to flow naturally or be stored in times of flood through application of suitable SuDS.**

Overall there are 114 potential sites to which Strategic Recommendation C applies (see Appendix B). 85 of these sites are entirely within Flood Zone 1, meaning surface water risk is what needs to be mitigated at these sites. Of the other 29 sites, 10 are partially (less than 10% of their areas) within the functional floodplain. **These areas must be removed from the site footprints or left clear to naturally flood. If this is not possible then these sites should be withdrawn from allocation.** An additional 15 of the 29 sites are partially (less than 10% of their areas) within Flood Zone 3a. Where possible**, these areas should also be left to flood naturally for the less vulnerable sites, or for the more vulnerable residential sites, the site boundary should be adjusted to remove the site from Flood Zone 3a or the Exception Test must be carried out and passed**.

5.5.4 Strategic Recommendation D – development could be allocated subject to FRA

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

This recommends that development could be allocated due to low flood risk perceived from the EA flood maps, assuming a site-specific FRA shows the site can be safe and it is demonstrated that the site is sequentially preferable. A site within Flood Zone 2 could still be rejected if the conclusions of the FRA decide development is unsafe or inappropriate.

Strategic Recommendation D applies to sites where the following criteria is true:

- Any site within Flood Zone 2 that does not have any part of its footprint within Flood Zone 3a, with the exception of a highly vulnerable development which would be subject to, and have to pass, the Exception Test.
- Less vulnerable and water compatible sites within Flood Zone 3a. No part of the site can be within Flood Zone 3b.
- Any site 100% within Flood Zone 1 where surface water flood risk is apparent but not considered significant.
- Any site 100% within Flood Zone 1 that is greater than or equal to 1 hectare in area.

Strategic Recommendation D applies to 127 potential sites overall, 110 of which are entirely within Flood Zone 1. 44 of these 110 are not within any surface water flood zones but are **equal to or greater than 1 hectare in size and therefore must be accompanied by a FRA to determine vulnerability to flooding from other sources as well as fluvial, tidal and surface water**. The other 66 sites out of the 110 are at some risk of surface water flooding and therefore require a FRA to assess the surface water risk. The FRA should determine the potential of increased flood risk elsewhere as a result of the addition of hard surfaces on-site and the effect of new development on surface water runoff.

5.5.5 Strategic Recommendation E - development could be permitted on flood risk grounds subject to consultation with the LPA / LLFA

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

This recommends that development could be allocated on flood risk grounds, based on the evidence provided within this SFRA. Further investigation (i.e. FRA) may be required by the developer if any further or new information becomes available since the publication of this SFRA. Recommendation E applies to 58 sites.

Strategic Recommendation E applies to any site with its area 100% within Flood Zone 1, not within any surface water flood zone and less than 1 hectare in size.

5.6 Assessment of climate change

As discussed in Volume I, the climate change information required by the EA for SFRAs and FRAs is not available for the majority of main rivers within the SFRA study area, including Copeland. For this SFRA therefore, the assumption should be that the current day Flood Zone 2 will become Flood Zone 3a in 100 years' time and Flood Zone 3a could become functional floodplain. However, as also explained in Volume I, predicting the future expansion of the functional floodplain would be more difficult due to the criteria use to define the functional floodplain outline.

This precautionary approach to estimating the effects of climate change is considered to be the most pragmatic methodology available and is also consistent with other SFRAs and professional modelling experience. As such, for any site within Flood Zone 2, the possibility of these sites being within Flood Zone 3a within 100 years' time should be considered. It is also important to consider that the sites that are partially within Flood Zone 3a and are also additionally at risk from Flood Zone 2 will have larger areas at risk from Flood Zone 3a in the future. For example, a site that may have 10% of its area currently within Flood Zone 3a and a further 60% within Flood Zone 2, may have 70% of its area within Flood Zone 3a in 100 years' time. This would impact on the more vulnerable sites in particular with potentially further, more detailed mitigation techniques required to satisfy the second part of the Exception Test.

It should however be noted that changes in flood zone extents in well-defined floodplains will be more negligible compared to very flat floodplains. However, changes in flood depth within the more well-defined floodplains will be greater. The expected increase in flood extents and depths

as a result of climate change will have implications for the type of development that is considered appropriate according to its vulnerability.

Flood risk to areas around estuaries may be more difficult to predict using this precautionary approach as estuarine flooding can result from the combined effects of high peak river flows and high tidal surges. In which case, the risk may be underestimated. In the case of Copeland this may affect potential development sites at Millom on the Duddon Estuary and at Drigg on the estuary of the Rivers Esk and Irt.

The same approach should also be applied to the surface water flood zones whereby the 1 in 100 AEP event outline (currently medium risk outline) may increase in the future to cover the extent of the 1 in 1000 AEP event outline (currently the low risk outline).

The Development Site Assessment spreadsheet (Appendix B) should be consulted to ascertain which sites may be at increased risk in the future based on the approach outlines above.

A more detailed assessment of the impacts of climate change on flooding from the land and rivers, and the coast if applicable, should be carried out as part of any Level 2 SFRA or FRA. This should be carried out using the EA's allowances presented in Volume I which will provide an appropriately robust response to the uncertainty about climate change impacts on rainfall intensities, river flows and sea level rise.

5.7 Summary of sequential testing outcomes and assessment of surface water risk

There are several outcomes which could come out of the sequential testing process and the surface water risk assessment described throughout Section 5. Each outcome is discussed below.

5.7.1 Rejection of site

A site which fails to pass the Sequential Test and / or the Exception Test would be rejected. Rejection would also apply to any highly, more or less vulnerable sites within Flood Zone 3b where development should not be permitted. The FRCC-PPG flood risk vulnerability classification states that only water-compatible uses and essential infrastructure should be permitted in Flood Zone 3b, though any essential infrastructure must pass the Exception Test and clearly demonstrate that it does not increase or exacerbate flood risk elsewhere. If the developer is able to avoid Flood Zone 3b, part of the site could still be delivered.

In terms of surface water flood risk, if risk is considered significant, based on AEP and development vulnerability, or where the size of the site does not allow for on-site storage or application of appropriate SuDS, then such sites could be rejected.

5.7.2 Exception Test required

Applies to those sites that, according to the FRCC-PPG vulnerability tables, would require the Exception Test. Only water-compatible and less vulnerable uses of land would not require the Exception Test in Flood Zone 3a. More vulnerable uses, including residential, and essential infrastructure are only permitted if the Exception Test is passed and all development proposals in Flood Zone 3a must be accompanied by a Flood Risk Assessment. To avoid having to apply the Exception Test, the developer / LPA should attempt to avoid the risk area altogether.

5.7.3 Consideration of site layout and design

Site layout and site design is important at the site planning stage where flood risk exists. The site area would have to be large enough to enable any alteration of the developable area of the site to remove development from the functional floodplain, or to leave space for on-site storage of flood water. Careful layout and design at the site planning stage may apply to such sites where it is considered viable based on the level of risk. Surface water flood risk and opportunities for SuDS should also be assessed during the planning stage.

Depending on local circumstances, if it is not possible to adjust the site boundary to remove the site footprint from Flood Zone 3b to a lower risk zone then development should not be permitted. If it is not possible to adjust the developable area of a site to remove the proposed development from Flood Zone 3a to a lower risk zone or to incorporate the on-site storage of water within site

design, then the Exception Test would have to be passed as part of a site-specific Flood Risk Assessment.

Any site layout and design within 8 m of any flood defence structure or culvert on a main river or 16 m on a tidal river is likely to be a regulated flood risk activity under Schedule 25 of the Environmental Permitting (England and Wales) Regulations 2016. Site layout and design options will have to take this into consideration for development proposals. This easement buffer is recommended by the EA to allow ease of access to watercourses for maintenance works. Any site redesign, where Flood Zone 3a is included within the site footprint, should allow water to flow naturally or be stored in times of flood through application of appropriate SuDS techniques (see Section 5.11).

5.7.4 Site-Specific Flood Risk Assessment

According to the FRCC-PPG (Para 030), a site-specific FRA is:

"*…carried out by (or on behalf of) a developer to assess the flood risk to and from a development site. Where necessary (see footnote 5 in the National Planning Policy Framework), the assessment should accompany a planning application submitted to the local planning authority. The assessment should demonstrate to the decision-maker how flood risk will be managed now and over the development's lifetime, taking climate change into account, and with regard to the vulnerability of its users (see Table 2 – Flood Risk Vulnerability of FRCC-PPG).*"

The objectives of a site-specific FRA are to establish:

Whether a proposed development is likely to be affected by current or future flooding (including effects of climate change) from any source. This should include referencing this SFRA to establish sources of flooding. Further analysis should be performed to improve understanding of flood risk including agreement with the council on areas of functional floodplain that have not been specified within this SFRA. Key objectives:

- Whether the development will increase flood risk elsewhere;
- Whether the measures proposed to deal with these effects and risks are appropriate;
- The evidence for the local planning authority to apply (if necessary) the Sequential Test; and
- Whether the development will be safe and pass the Exception Test, if applicable.

When is a Site-Specific FRA Required?

According to NPPF footnote 5, a site-specific FRA should be prepared when the application site is:

- Situated in Flood Zone 2 and 3; for all proposals for new development (including minor development and change of use)
- 1 hectare or greater in size and located in Flood Zone 1
- Located in Flood Zone 1 where there are critical drainage problems (as notified to the LPA by the EA)
- At risk of flooding from other sources of flooding, such as those identified in this SFRA
- Subject to a change of use to a higher vulnerability classification which may be subject to other sources of flooding

The LPA may also like to consider further options for stipulating FRA requirements, such as:

- Situated in an area currently benefitting from defences
- Situated within 20 metres of the bank top of a Main River
- Situated over a culverted watercourse or where development will require controlling the flow of any river or stream or the development could potentially change structures known to influence flood flow

These further options should be considered during the preparation and development of the Local Plan

Paragraph 031 of the FRCC-PPG contains information regarding the level of detail required in that FRAs should always be proportionate to the degree of flood risk whilst making use of existing information, including this SFRA. Paragraph 068 of the FRCC-PPG contains an easy to follow FRA checklist for developers to follow.

Together with the information in the FRCC-PPG, there is further detail and support provided for the LPA and developers in the EA's FRA guidance[28] and also the EA guidance for FRAs for planning applications[29]. CIRIA's report 'C624 Development and Flood Risk[30]' also provides useful guidance for developers and the construction industry. Section 5.10 of this report provides further guidance on FRAs for developers.

5.7.5 Sites passing the Sequential and Exception Tests

Development sites can be allocated or granted planning permission where the Sequential Test and the Exception Test (if required) are passed. In addition, a site is likely to be allocated without the need to assess flood risk where the proposed use is for open space. Assuming the site is not to include any development and is to be left open then the allocation is likely to be acceptable from a flood risk point of view. However, for sites where there is potential for flood storage, options should be explored as part of an FRA.

In terms of opportunities for reducing flood risk overall as a requirement of the Exception Test, the FRCC-PPG states:

"Local authorities and developers should seek opportunities to reduce the overall level of flood risk in the area and beyond. This can be achieved, for instance, through the layout and form of development, including green infrastructure and the appropriate application of sustainable drainage systems, through safeguarding land for flood risk management, or where appropriate, through designing off-site works required to protect and support development in ways that benefit the area more generally." (Paragraph 50).

28 https://www.gov.uk/flood-risk-assessment-local-planning-authorities

29 https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications

30 CIRIA C624 Development and Flood Risk - guidance for the construction industry. 2004

5.7.6 Sites at risk from surface water flooding

For sites at surface water flood risk the following should be considered:

- Possible withdrawal, redesign or relocation of the site for those sites identified to be at significant risk.
- A detailed site-specific FRA incorporating surface water flood risk management or drainage strategy for larger strategic sites;
- A FRA may want to consider detailed surface water modelling, particularly for the larger sites which may influence sites elsewhere;
- The size of development and the possibility of increased surface water flood risk caused by development on current Greenfield land (where applicable), and cumulative impacts of this within specific areas;
- Management and re-use of surface water on-site, assuming the site is large enough to facilitate this and achieve effective mitigation. Effective surface water management should ensure risks on and off site are controlled;
- Larger sites could leave surface water flood prone areas as open greenspace, incorporating social and environmental benefits;
- SuDS should be used where possible. Appropriate SuDS may offer opportunities to control runoff to Greenfield rates or better. Restrictions on surface water runoff from new development should be incorporated into the development planning stage. For brownfield sites, where current infrastructure may be staying in place, then runoff should attempt to mimic that of Greenfield rates, unless it can be demonstrated that this is unachievable or hydraulically impractical. Developers should refer to the national 'non-statutory technical standards for sustainable drainage systems' and other guidance documents cited in Section 5.11 of this report;
- Runoff up to and including the 1% AEP event should be managed on site where possible;
- Measures of source control should be required for development sites;
- Developers should be required to set part of their site aside for surface water management, to contribute to flood risk management in the wider area and supplement green infrastructure networks;
- Developers should be required to maximise permeable surfaces;
- Flow routes on new development where the sewerage system surcharges as a consequence of exceedance of the 1 in 30 AEP design event should be retained; and
- Whether the potential site is located within a CDA (see Section 4.2.1) and what restrictions may apply in terms of development management and control. Detailed analysis and consultation with the LLFA, UU, any relevant Internal Drainage Board and the EA would be required. It may then be beneficial to carry out a SWMP or drainage strategy for the locations within the CDAs. Investigation into the capacity of existing sewer systems would be required in order to identify critical parts of the system. Drainage model outputs should be obtained to confirm the critical parts of the drainage network and subsequent recommendations could then be made for future development i.e. strategic SuDS sites, parts of the drainage system where any new connections should be avoided, and parts of the system that may have any additional capacity and recommended runoff rates.

5.8 Sustainability Appraisal and flood risk

The Sustainability Appraisal should help to ensure that flood risk is taken into account at all stages of the planning process with a view to directing development away from areas at flood risk, now and in the future, by following the sequential approach to site allocation (Figure 5-2).

By avoiding sites identified in this SFRA as being at significant risk, such as those listed in Section 5.5.1, or by considering how changes in site layout can avoid those parts of a site at flood risk, such as any site included within Strategic Recommendation C (Section 5.5.3), the LPA would be demonstrating a sustainable approach to development.

In terms of surface water, the same approach should be followed whereby those sites at highest risk should be avoided or site layout tailored to ensure sustainable development. This should involve investigation into appropriate SuDS techniques (see Section 5.11). Given that the preferred approach to SuDS is for infiltration to the groundwater, this may not always be possible depending on the local ground conditions, such as geology, soils and average groundwater levels. The majority of Copeland is thought to be unsuitable for infiltration SuDS, however local ground conditions should be assessed at the development planning stage.

Once the LPA has decided on a final list of sites following application of the Sequential Test and, where required, the Exception Test following a site-specific FRA, a phased approach to development should be carried out to avoid any cumulative impacts that multiple developments may have on flood risk. For example, for any site where it is required, following the Sequential Test, to develop in Flood Zone 3a, detailed modelling would be required to ascertain where displaced water, due to development, may flow and to calculate subsequent increases in downstream flood volumes. The modelling should investigate scenarios based on compensatory storage techniques to ensure that downstream or nearby sites are not adversely affected by development on other sites.

Using a phased approach to development, based on modelling results of floodwater storage options, should ensure that any sites at risk of causing flooding to other sites are developed first in order to ensure flood storage measures are in place before other sites are developed, thus ensuring a sustainable approach to site development. Also, it may be possible that flood mitigation measures put in place at sites upstream could alleviate flooding at downstream or nearby sites (see Volume I for information on NFM and WwNP).

5.9 Safeguarding land for flood storage

Where possible, the LPA may look to allocate land designed for flood storage functions. Such land can be explored through the site allocation process whereby an assessment is made, using this SFRA, of the flood risk at potential sites and what benefit could be gained by leaving the site undeveloped. In some instances, the storage of flood water can help to alleviate flooding elsewhere, such as downstream developments. Where there is a large area of a site at risk that is considered large enough to hinder development, it may be appropriate to safeguard this land for the storage of flood water.

Applicable sites include any current greenfield sites:

- That are considered to be large enough (>1 hectare) to store flood water to achieve effective mitigation,
- With large areas of their footprint at high or medium surface water flood risk (based on the RoFSW),
- That is within the functional floodplain (Flood Zone 3b),
- With large areas of their footprint at risk from Flood Zone 3a, and
- That are large enough and within a suitable distance to receive flood water from a nearby development site using appropriate SuDS techniques which may involve pumping, piping or swales / drains.

Brownfield sites could also be considered though this would entail site clearance of existing buildings and conversion to greenspace.

By using the sequential approach to site layout, the LPA and developers should be able to avoid the areas at risk and leave clear for potential flood storage. See the SFRA Maps in Appendix A to spatially assess the areas of the sites at risk.

5.10 Guidance for developers

This SFRA provides the evidence base for developers to assess flood risk at a strategic level and to determine the requirements of an appropriate site-specific FRA. Before carrying out an FRA, developers should check with the LPA whether the Sequential Test has been carried out. If not, the developer must apply the Sequential Test as part of their FRA by comparing their proposed

development site with other available sites to ascertain which site has the lowest flood risk. The EA provides advice on this via:

https://www.gov.uk/guidance/flood-risk-assessment-the-sequential-test-for-applicants

When initially considering the development options for a site, developers should use this SFRA, the NPPF and the FRCC-PPG to:

- ***Identify whether the site is***
    - *A windfall development, allocated development, within a regeneration area, single property or subject to a change of use to identify if the Sequential and Exception Tests are required.*
- ***Check whether the Sequential Test and / or the Exception Test have already been applied (see Figure 5-3)***
    - *Request information from the LPA on whether the Sequential Test, or the likelihood of the site passing the Exception Test, have been assessed;*
    - *If not, provide evidence to the LPA that the site passes the Sequential Test and will pass the Exception Test.*
- ***Consult with the LPA, the LLFA and the EA and the wider group of flood risk consultees, where appropriate, to scope an appropriate FRA if required***
    - *Guidance on FRAs provided in Section 5.7.4 of this SFRA;*
    - *Also, refer to the EA Standing Advice, CIRIA Report C624, the NPPF and the FRCC-PPG;*
    - *Consult the LLFA.*
- ***Submit FRA to the LPA and the EA for approval, where necessary***

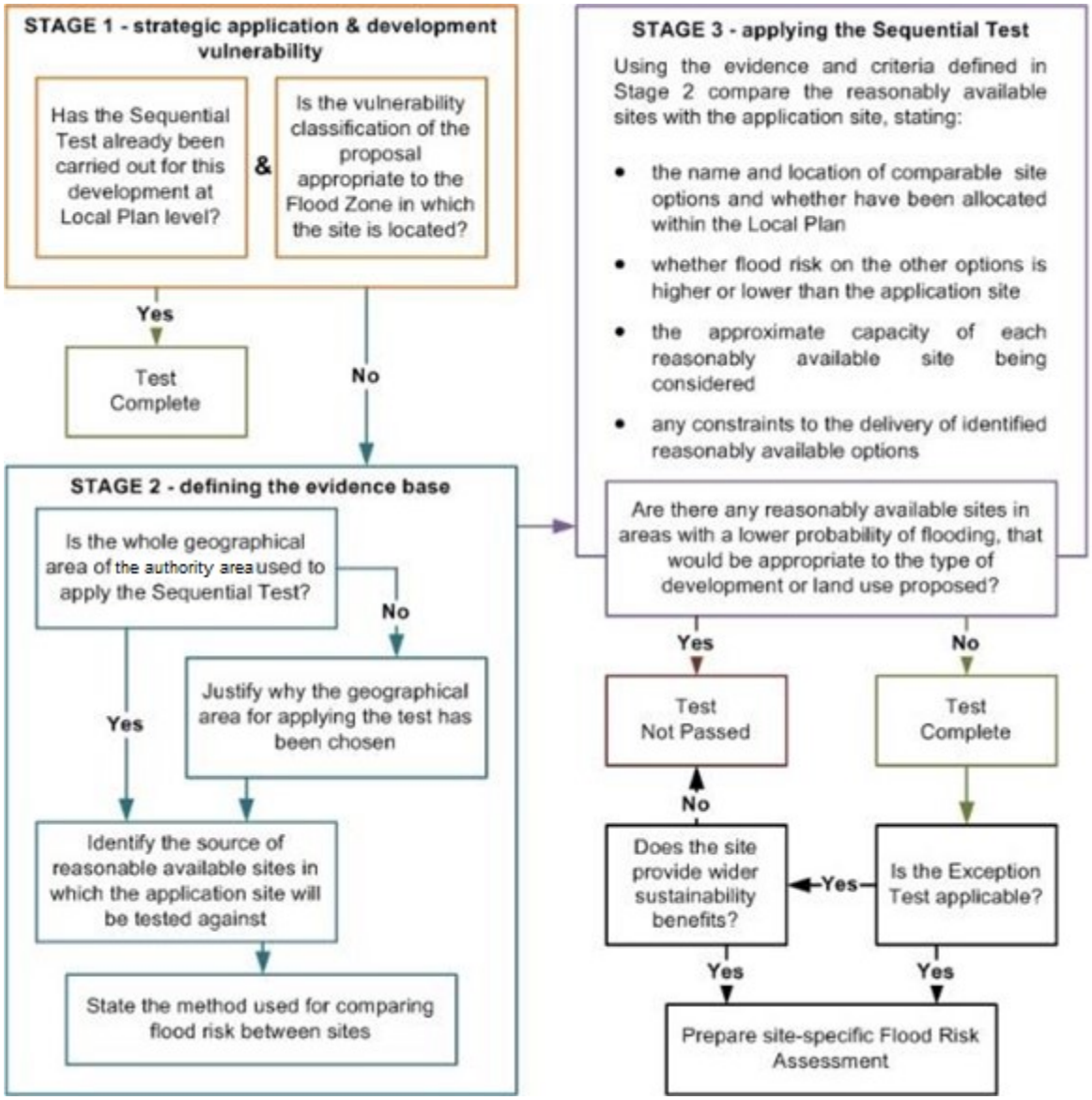
Table 5-7 identifies, for developers, when the Sequential and Exception Tests are required for certain types of development and who is responsible for providing the evidence and those who should apply the tests if required.

Table 5-7: Development types and application of Sequential and Exception Tests for developers

Development	Sequential Test Required?	Who Applies the Sequential Test?	Exception Test Required?	Who Applies the Exception Test?
Allocated Sites	No (assuming the development type is the same as that submitted via the allocations process)	LPA should have already carried out the test during the allocation of development sites	Dependent on land use vulnerability	LPA to advise on the likelihood of test being passed. The developer must also provide evidence that the test can be passed by providing planning justification and producing a detailed FRA
Windfall Sites	Yes	Developer provides evidence, to the LPA that the test can be passed. An area of search will be defined by local circumstances relating to the catchment and for the type of development being proposed	Dependent on land use vulnerability	Developer must provide evidence that the test can be passed by providing planning justification and producing a detailed FRA
Regeneration Sites Identified Within Local Plan	No	-	Dependent on land use vulnerability	LPA to advise on the likelihood of test being passed. The developer must also provide evidence that the test can be passed by providing planning justification and producing a detailed FRA
Redevelopment of Existing Single Properties	No	-	Dependent on land use vulnerability	Developer must provide evidence that the test can be passed by providing planning justification and producing a detailed FRA
Changes of Use	No (except for any proposal involving changes of use to land involving a caravan, camping or chalet site)	Developer provides evidence to the LPA that the test can be passed	Dependent on land use vulnerability	Developer must provide evidence that the test can be passed by providing planning justification and producing a detailed FRA

Figure 5-3 shows what developers should do with regards to applying the Sequential Test if the LPA has not already done so.

Figure 5-3: Development management Sequential Test process



The Sequential Test does not apply to change of use applications unless it is for change of land use to a caravan, camping or chalet site, or to a mobile home site or park home site. The Sequential Test can also be considered adequately demonstrated if both of the following criteria are met:

- The Sequential Test has already been carried out for the site (for the same development type) at the strategic level (Local Plan); and
- The development vulnerability is appropriate to the Flood Zone (see Table 3 of the FRCC-PPG).

If both these criteria are met, reference should be provided for the site allocation of the Local Plan document and the vulnerability of the development should be clearly stated.

When applying the Sequential Test, the following should also be considered:

- **The geographic area in which the Test is to be applied;**

- **The source of reasonable available sites in which the application site will be tested against; and**
- **The evidence and method used to compare flood risk between sites.**

Sites should be compared in relation to flood risk; Local Plan status; capacity; and constraints to delivery including availability, policy restrictions, physical problems or limitations, potential impacts of the development on the local area, and future environmental conditions that would be experienced by the inhabitants of the development.

The test should conclude if there are any reasonably available sites in areas with a lower probability of flooding that would be appropriate to the type of development or land use proposed.

The LPA should now have sufficient information to be able to assess whether or not the proposed site has passed the Sequential Test. If the Test has been passed, then the developer should apply the Exception Test in the circumstances set out by tables 1 and 3 of the FRCC-PPG.

In all circumstances, where the site is within areas at risk of flooding and where a site-specific FRA has not already been carried out, a site-specific FRA should be completed in line with the NPPF and the FRCC-PPG.

In addition to the formal Sequential Test, the NPPF sets out the requirement for developers to apply the sequential approach to locating development within the site. As part of their application and masterplanning discussions with applicants, LPAs should seek whether or not:

- Flood risk can be avoided by substituting less vulnerable uses or by amending the site layout;
- Less vulnerable uses for the site have been considered; or
- Density can be varied to reduce the number or the vulnerability of units located in higher risk parts of the site.

Developers should refer to the SFRA Maps in Appendix A to see if any proposed developments sites are within an ABD and to Volume I for information regarding compensatory flood storage options and residual risk.

5.11 Sustainable Drainage Systems (SuDS)

Development has the potential to cause an increase in impermeable area, an associated increase in surface water runoff rates and volumes, and consequently a potential increase in downstream flood risk due to overloading of sewers, watercourses, culverts and other drainage infrastructure. Managing surface water discharges from new development is therefore crucial in managing and reducing flood risk to new and existing development downstream. Carefully planned development can also play a role in reducing the amount of properties that are directly at risk from surface water flooding.

The Department for Communities and Local Government (DCLG) announced, in December 2014, that local planners should be responsible for delivering SuDS[31]. Changes to planning legislation gave provisions for major applications of ten or more residential units or equivalent commercial development to require sustainable drainage within the development proposals in accordance with the 'non-statutory technical standards for sustainable drainage systems'[32], published in March 2015. A Practice Guidance[33] document has also been developed by the Local Authority SuDS Officer Organisation (LASOO) to assist in the application of the non-statutory technical standards.

This builds on the existing planning system, the NPPF, which developers and local authorities are already using. Policy changes to the planning system can also be introduced relatively quickly ensuring that flood risk benefits from sustainable drainage systems can be brought forward as part of planning application proposals. The NPPF continues to reinforce how planning applications

31 http://www.parliament.uk/business/publications/written-questions-answers-statements/written-statement/Commons/2014-12-18/HCWS161/

32 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/415773/sustainable-drainage-technical-standards.pdf

33 http://www.susdrain.org/files/resources/other-guidance/lasoo_non_statutory_suds_technical_standards_guidance_2016_.pdf

that fail to deliver SuDS above conventional drainage techniques could be rejected and sustainable drainage should form part of integrated design secured by detailed planning conditions so that the SuDS to be constructed must be maintained to a minimum level of effectiveness.

Maintenance options must clearly identify who will be responsible for SuDS maintenance and funding for maintenance should be fair for householders and premises occupiers; and, set out a minimum standard to which the sustainable drainage systems must be maintained.

The runoff destination should always be the first consideration when considering design criteria for SuDS including the following possible destinations in order of preference:

1. To ground;
2. To surface water body;
3. To surface water sewer;
4. To combined sewer.

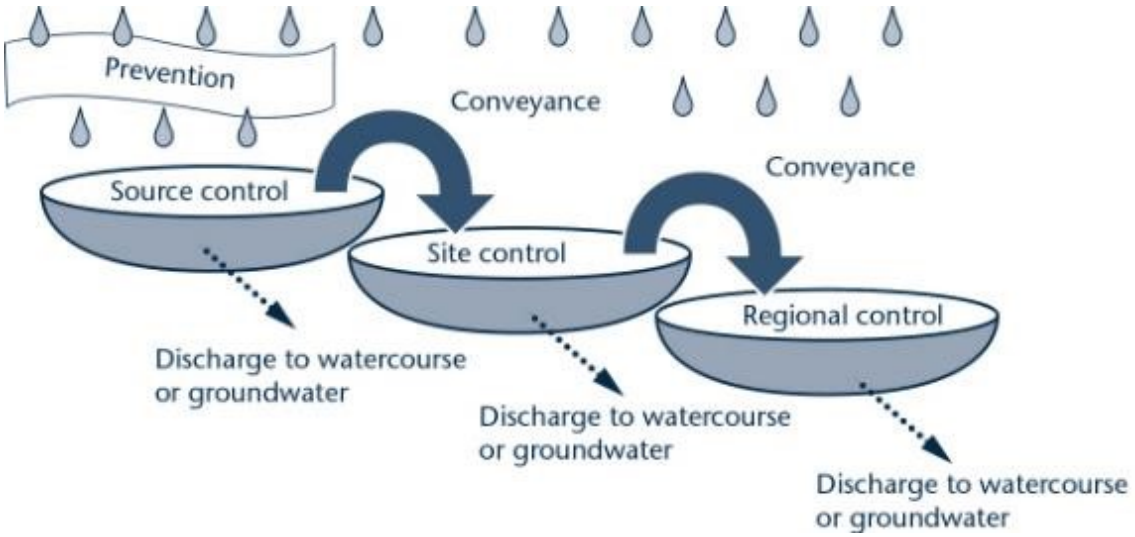
Effects on water quality should also be investigated when considering runoff destination in terms of the potential hazards arising from development and the sensitivity of the runoff destination. Developers should also establish that proposed outfalls are hydraulically capable of accepting the runoff from SuDS through consultation with the LLFA, EA and UU.

The non-statutory technical standards for sustainable drainage systems (March 2015) sets out appropriate design criteria based on the following:

1. Flood risk outside the development;
2. Peak flow control;
3. Volume control;
4. Flood risk within the development;
5. Structural integrity;
6. Designing for maintenance considerations;
7. Construction.

Many different SuDS techniques can be implemented. As a result, there is no one standard correct drainage solution for a site. In most cases, a combination of techniques, using the Management Train principle (see Figure 5-4), will be required, where source control is the primary aim.

Figure 5-4: SuDS Management Train Principle[34]



34 CIRIA (2008) Sustainable Drainage Systems: promoting good practice – a CIRIA initiative

The effectiveness of a flow management scheme within a single site is heavily limited by land use and site characteristics including (but not limited to) topography; geology and soil (permeability); and available area. Potential ground contamination associated with urban and former industrial sites should be investigated with concern being placed on the depth of the local water table and potential contamination risks that will affect water quality. The design, construction and ongoing maintenance regime of any SuDS scheme must be carefully defined as part of a site-specific FRA. A clear and comprehensive understanding of the catchment hydrological processes (i.e. nature and capacity of the existing drainage system) is essential for successful SuDS implementation.

In addition to the national standards, the LPA may set local requirements for planning permission that include more rigorous obligations than these non-statutory technical standards. CCC LLFA asks for Non-Statutory National Standards for SuDS and adequate water quality treatment in accordance with the SuDS Manual 2015. More stringent requirements should be considered where current Greenfield sites lie upstream of high risk areas. This could include improvements on Greenfield runoff rates. Also, where a site is within a CDA, the LPA should be consulted on its requirements on new development that must be adhered to.

The LPA should always be contacted with regards to its local requirements at the earliest opportunity in development planning.

The CIRIA SuDS Manual[35] 2007 should also be consulted by the LPA and developers. The SuDS manual (C697) is highly regarded and was updated in 2016 to incorporate the latest research, industry practice, technical advice and adaptable processes to assist in the planning, design, construction, management and maintenance of good SuDS. The SuDS Manual complements the non-statutory technical standards and goes further to support the cost-effective delivery of multiple benefits.

5.11.1 Drainage for New Developments

Development has the potential to cause an increase in impermeable area, an associated increase in surface water runoff rates and volumes, and a consequent potential increase in downstream flood risk due to overloading of sewers, watercourses, culverts and other drainage infrastructure.

Managing surface water discharges from new development is crucial in managing and reducing flood risk to new and existing development.

Carefully planned development can also play a role in reducing the amount of properties that are directly at risk from surface water flooding. The Planning System has a key role to play in setting standards for sustainable drainage from new developments and ensuring that developments are designed to take account of the risk from surface water flooding. Sustainable drainage plays an important part in reducing flows in the sewer network and in meeting environmental targets, alongside investment in maintenance by the water companies on their assets. Water companies plan their investment on a five year rolling cycle, in consultation with key partners, including the EA and Cumbria LLFA. **The Cumbria LLFA Development Design Guide, approved in November 2017, provides detailed design guidance on such matters / drainage for new developments.**

5.11.2 Overland Flow Paths

Underground drainage systems have a finite capacity and regard should always be given to larger events when the capacity of the network will be exceeded. Hence there is a need to design new developments with exceedance in mind. This should be considered alongside any surface water flows likely to enter a development site from the surrounding area.

Masterplanning should ensure that existing overland flow paths are retained within the development. As a minimum, the developer should investigate, as part of a FRA, the likely extents, depths and associated hazards of surface water flooding on a development site, as shown by the RoFSW dataset. This is considered to be an appropriate approach to reduce the risk of flooding to new developments. Green infrastructure should be used wherever possible to accommodate

35 https://www.ciria.org/Memberships/The_SuDs_Manual_C753_Chapters.aspx

such flow paths. **Floor levels should always be set a minimum of 300 mm above adjacent roads** to reduce the consequences of any localised flooding.

The effectiveness of a flow management scheme within a single site is heavily limited by site constraints including (but not limited to) topography; geology and soil (permeability); development density; existing drainage networks both on-site and in the surrounding area; adoption issues; and available area. The design, construction and ongoing maintenance regime of such a scheme must be carefully defined at an early stage and a clear and comprehensive understanding of the catchment hydrological processes (i.e. nature and capacity of the existing drainage system) is essential.

5.11.3 New development within a Critical Drainage Area

As explained in Volume I and Section 4.2.1 of this Volume II report, the CDAs throughout the four local authority areas should come with certain development restrictions and guidance attached to them which developers must adhere to. **As discussed, at the time of writing, development control policy has not yet been formulated. It is recommended that this is done in the short term, in consultation with the LLFA.**

The specific conditions attached to the Whitehaven and Moresby Parks CDA, as stated in the Cumbria SWMP (2012), are that:

- any future development in the Kells/Woodhouse/Marchon area (west Whitehaven) should drain west, to the sea or via an attenuated system to Rottington Beck to the south;
- disposal of surface water to the combined or foul sewer network should be prevented; and
- upstream storage options on larger watercourses should be investigated by the LLFA.

There are 58 potential development sites either wholly or partially within the boundary of the Whitehaven CDA. 33 of these sites are proposed for residential use, 14 for mixed use and 11 for employment. The SFRA Maps show the CDA boundary and the locations of the sites and the Development Site Assessment spreadsheet lists the 58 sites for which the CDA restrictions should apply. For sites partially within the CDA the restrictions may not be so onerous as the restrictions may only apply to the parts of the sites within the CDA boundary. **Developers always should consult the LPA as to specific requirements for their site.**

6 Conclusions and Recommendations

6.1 Conclusions

This SFRA provides a single repository planning tool relating to flood risk and development in Copeland outside of the Lake District National Park. Key flood risk stakeholders namely the EA, Cumbria County Council as the LLFA, the other three LPAs involved in this commission and United Utilities were consulted to collate all available and relevant flood risk information on all sources into one comprehensive assessment. Together with this report, this SFRA also provides a suite of interactive GeoPDF flood risk maps (Appendix A) and a Development Site Assessment spreadsheet (Appendix B) illustrating the level of risk to the potential development sites identified by CBC, with subsequent strategic recommendations.

The flood risk information, assessment, guidance and strategic recommendations on development viability contained in the SFRA, will provide the LPA with the evidence base required to apply the Sequential and Exception Tests, as required under the NPPF, and demonstrate that a risk based, sequential approach has been applied in the preparation of its new Local Plan.

Whilst the aim of the Sequential Approach is the avoidance of high flood risk areas, in locations such as Whitehaven, where the council is looking for continued growth and regeneration, this will not always be possible. This SFRA therefore provides the necessary links between spatial development, wider flood risk management policies, local strategies / plans and on the ground works by combining all available flood risk information together into one single repository. As this is a Level 1 strategic study, detailed local information on flood risk is not fully accounted for. For a more detailed assessment of specific areas or sites, a Level 2 SFRA or more localised flood risk strategy may be carried out following on from the baseline provided by this Level 1 assessment.

The data and information used throughout the SFRA process is the most up-to-date available at the time. Once new, updated or further information becomes available, the LPA should look to update this SFRA. The Level 1 SFRA should be considered to be, and maintained as, a live assessment which is updated as and when required.

6.2 Planning Policy and flood risk recommendations

The following planning policy recommendations relating to flood risk are designed to enable the LPA to translate the information provided in this Level 1 SFRA into meaningful Local Plan policy for flood risk and water management:

Policy Recommendation 1: No development within Flood Zone 3b…

…as per the NPPF and FRCC-PPG, unless in exceptional circumstances such as for essential infrastructure or where development is water compatible.

Development must not impede the flow of water within Flood Zone 3b nor should it reduce the volume available for storage of flood water.

Refer to tables 1 to 3 of the FRCC-PPG.

Policy Recommendation 2: Consider surface water flood risk…

…alongside fluvial and tidal risk in terms of importance, including possible withdrawal, redesign or relocation for sites identified to be at significant surface water risk.

Flood Risk Assessments should always consider surface water flood risk management and options for on-site flood storage through appropriate SuDS. The LPA and LLFA should always be consulted during this process, as should UU and the EA if required.

Policy Recommendation 3: Sequential approach to site allocation and site layout…

…must be followed by the LPA to ensure sustainable development when either allocating land in Local Plans or determining planning applications for development.

The overall aim of the Sequential Approach should be to steer new development to low risk Flood Zone 1. Where there are no reasonably available sites in Flood Zone 1, the flood risk vulnerability of land uses and reasonably available sites in Flood Zone 2 should be considered, applying the Exception Test if required.

Only where there are no reasonably available sites in Flood Zones 1 or 2 should the suitability of sites in higher risk Flood Zone 3a, be considered. This should take into account the flood risk vulnerability of land uses and the likelihood of meeting the requirements of the Exception Test, if required.

This SFRA, the NPPF and FRCC-PPG should be consulted throughout this process along with the LPA. LLFA. EA and UU.

Policy Recommendation 4: Requirement for a site-specific Flood Risk Assessment…

…from a developer when a site is:

- Within Flood Zone 3a or Flood Zone 2
- At risk from surface water flooding
- Within a Critical Drainage Area
- Within Flood Zone 1 and 1 hectare or greater in size
- Situated in an area currently benefitting from defences
- Situated within 20 metres of the bank top of a Main River
- Situated over a culverted watercourse or where development will be required to control or influence the flow of any watercourse

Before deciding on the scope of the FRA, this SFRA should be consulted along with the LPA, LLFA and EA. The FRA should be submitted to and approved by the LPA including suitable consultation with the LLFA and the EA (the EA should be consulted with regards to surface water if surface water is being discharged from the site to a Main River).

Policy Recommendation 5: Use of appropriately sourced of SuDS…

…required for all major developments of 10 or more residential units or equivalent commercial development. This is in accordance with the interim national standards published in March 2015.

SuDS scoping and design, as part of a site-specific FRA, SWMP or drainage strategy, must be included within the early stages of the site design in order to incorporate the appropriate SuDS techniques within the development.

The LPA, LLFA, UU and IDB (if appropriate) must be consulted during the site design stage and the FRA must be submitted to and approved by the LPA, considering all consultation with key stakeholders.

The EA should be consulted with regards to surface water if surface water is being discharged from the site to a Main River.

Policy Recommendation 6: Phasing of development…

…should be carried out by the LPA to avoid any cumulative impacts of flood risk.

Using a phased approach to development, should ensure that any sites at risk of causing flooding to other sites are developed first in order to ensure flood storage measures are in place before other sites are developed, thus contributing to a sustainable approach to site development.

It may be possible that flood mitigation measures (i.e. NFM/WwNP) put in place at sites upstream could alleviate flooding at downstream or nearby sites.

Policy Recommendation 7: Planning permission for at risk sites…

…can only be granted by the LPA where a site-specific FRA shows that:

- The NPPF and FRCC-PPG have been referenced together with appropriate consultation with the LLFA, EA, UU and the IDB, where applicable
- The effects of climate change have been taken into account using the latest allowances developed by the EA
- There is no loss in floodplain storage resulting from the development
- Appropriate SuDS techniques have been considered and are to be incorporated into the design of the site, where applicable
- The development will not cause flooding elsewhere or increase flood risk elsewhere
- There is no adverse effect on the operational functions of any existing flood defence infrastructure
- Proposed resistance / resilience measures designed to deal with current and future risks are appropriate, where applicable
- There are always safe access and egress routes available during times of flood
- The development will be safe for its lifetime and has passed the Exception Test, if applicable.

6.3 Recommendations for further work

The SFRA process has developed into more than just a planning tool. Sitting alongside the Cumbria LFRMS, SWMP and PFRA; and the FRMPs and RBMPs, it can be used to provide a much broader and inclusive vehicle for integrated, strategic and local flood risk management and delivery.

There are a number of plans and assessments listed in Table 6-1 that would be of benefit to CBC and / or CCC as the LLFA, in developing their flood risk evidence base to support the delivery of their Local Plan or to help fill critical gaps in flood risk information.

6.3.1 Level 2 SFRA

The LPA should review the potential development sites where they expect the main housing numbers and employment sites to be delivered, using Section 5.5 of this report, the SFRA Maps in Appendix A and the Development Site Assessment spreadsheet in Appendix B. A Level 2 SFRA will be required if a large site, or group of sites, are within Flood Zone 3 and have key strategic planning objectives, which means they cannot be relocated or avoided. The Level 2 assessment can assess the likelihood of such sites passing the second part of the Exception Test. A Level 2 SFRA may also be required if the majority of the sites are within Flood Zone 2 or are at significant risk of surface water flooding.

Residual flood risk should also be taken account of through the Level 2 SFRA when considering options for future work, as should investigations into development phasing. It is possible to, through various analytical and/or modelling techniques, to predict the impact the increase in impermeable areas, due to development, will have on the surrounding areas. From this it is possible to make recommendations on the timings of construction to help mitigate flood risk to other potential sites or existing sites. As discussed in Section 5.6, a Level 2 assessment can be used to model the EA's latest climate change allowances, where current EA models are available.

Whilst the Level 1 study informs the decision-making process and goes some way in informing the likelihood of passing the Exception Test, it does not provide the level of detail required to assess whether or not the Exception Test could be passed. A Level 2 SFRA should build on the source information provided in this Level 1 assessment and should show that a site will not increase risk to others and will be safe for its lifetime, once developed, and will pass the Exception Test, if required. A Level 2 study may also assess locations and options for the implementation of open space, or Green Infrastructure, to help manage flood risk in key areas.

The LPA will need to provide evidence in their Local Plan to show that housing supply numbers, employment site numbers for economic requirements, and other sites can be delivered. The Local Plan may be rejected if a large number of sites require the Exception Test to be passed but with no evidence that this will be possible.

Once all sites within this Level 1 assessment have been reviewed by the LPA then further advice or guidance should be sought to discuss possible next steps. The EA provides information on the requirements of a Level 2 SFRA:

https://www.gov.uk/guidance/local-planning-authorities-strategic-flood-risk-assessment#level-2-strategic-flood-risk-assessment

It should include the detailed nature of the flood hazard within a flood zone including:

- Flood probability;
- Flood depth;
- Flood velocity;
- Rate of onset of flooding; and
- Duration of flood

The Level 2 SFRA should also assess information on formal raised flood defences and flood defence infrastructure including their location, condition and an assessment of residual risk (defence infrastructure breaching and overtopping scenarios) and what properties, infrastructure and communities may be affected.

Table 6-1: Recommended further work for the LPA / LLFA

Type	Study	Explanation	Timeframe
Understanding of local flood risk	EA Flood Risk Mapping updates / Level 1 SFRA update	EA modelling updates of older models e.g. Skirting Beck. Updates of Flood Map for Planning upon completion	Medium term
	Level 2 SFRA	Further, more detailed assessment of flood risk to high risk sites, as notified by this Level 1 SFRA	Short term
	SWMP / drainage strategy / Level 2 SFRA	For those high surface water risk sites / areas, as notified by this Level 1 SFRA, and those sites within a CDA	Short term
	Climate change assessment for Level 1 update or Level 2 SFRA	Modelling of climate change for available EA models, where applicable	Short term

Type	Study	Explanation	Timeframe
	SWMP / drainage strategy	Strategic scale update of the 2012 Cumbria SWMP or more detailed strategy for the Whitehaven CDA	Medium term
	CDA designation	Recommendation for a CDA in Millom. LPA needs to attach policy to CDAs in order to better regulate development in such areas	Medium Term
Flood storage and flood alleviation	Community Infrastructure Levy (CIL). WwNP and GI Assessment	For new developments, GI assets can be secured from a landowner's 'land value uplift' and as part of development agreements. The LPA could include capital for the purchase, design, planning and maintenance of GI within its CIL programme. Further assess WwNP options in upper catchments	Short term
Data Collection	Flood Incident Data	The LLFA, has a duty to investigate and record details of locally significant flood events within the Borough. General data collected for each incident, should include date, location, weather, flood source (if apparent without an investigation), impacts (properties flooded or number of people affected) and response by any RMA.	Short Term / Ongoing
	FRM Asset Register	The LLFA should continue to update and maintain their flood risk management register of structures and features (i.e. culverts, bridges, gullies), and have a record of critical assets	Short Term / Ongoing
Flood Risk Management	Asset condition assessments / surveys	The LLFA should consider surveying all FRM assets for condition grades subsequent requirements for remedial works, repairs or replacement	Medium term
Risk assessment	Asset Register Risk Assessment	The LLFA should carry out a strategic assessment of structures and features on the FRM Asset Register to inform capital programme and prioritise maintenance programme.	Medium term
Capacity	SuDS review / guidance	The LPA should identify internal capacity required to deal with SuDS applications, in conjunction with the LLFA, on existing and new development	Short term
Partnership	United Utilities	The LLFA should continue to work with UU on sewer and surface water projects. The LPA should be kept informed	Ongoing
	EA	The LLFA and LPA should continue to work with the EA on fluvial and tidal flood risk management projects whilst also identifying potential opportunities for joint schemes to tackle flooding from all sources.	Ongoing
	Community	Continued involvement with the local community through existing flood risk partnerships and groups	Ongoing

Appendices

A SFRA Maps

Interactive GeoPDF Maps

Open the two Index Maps (Copeland north of the LDNP and Copeland south of the LDNP) in Adobe Acrobat (2016s5300_CBC_SFRA_Index_1.pdf & 2016s5300_CBC_SFRA_Index_2.pdf).

The Index Maps contain a set of index squares covering the authority area, outside of the LDNP, at a scale of 1:10,000. Clicking on one of these index squares will open up a more detailed map of that area (scale = 1:10,000) by way of a hyperlink.

Within the detailed maps, use the zoom tools and the hand tool to zoom in/out and pan around the open detailed map. In the legend on the right-hand side of the detailed maps, layers can be switched on and off when required by way of a dropdown arrow. The potential development site reference labels can also be switched on and off if, for example, smaller sites are obscured by the labels.

B Development Site Assessment Spreadsheet

Excel spreadsheet containing an assessment of flood risk to the potential development sites based on Flood Zones 2, 3a and 3b as delineated through this SFRA, and also the Risk of Flooding from Surface Water map (RoFSW). The spreadsheet also states whether a site is within a CDA.

C Functional Floodplain Delineation

Technical note explaining the methodology behind the delineation of the functional floodplain (Flood Zone 3b) for this SFRA.

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