Darlington Borough Council

Level 1 Strategic Flood Risk Assessment

Final Report

April 2019

Darlington Borough Council

Spatial Planning Services

Town Hall

Darlington

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Revision History

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V1.0 Final / February 2019	EA, SBC comments, updated 2018 NPPF policy, additional site screening	Fiona McCall
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Contract

This report describes work commissioned by Fiona McCall of Darlington Borough Council, on behalf of Darlington Borough Council by a letter dated 1st October 2017. The lead representative for the contract was Fiona McCall. Rachel Bryan of JBA Consulting carried out this work.

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Purpose

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JBA Consulting has no liability regarding the use of this report except to the client.

Acknowledgements

JBA would like to thank all Darlington Borough Council, Environment Agency and Northumbrian Water 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 Level 1 Strategic Flood Risk Assessment (SFRA) is an update to the 2009 Level 1 SFRA using up-to-date flood risk information together with the most current flood risk and planning policy available from the National Planning Policy Framework[1] (NPPF) (2018) and Flood Risk and Coastal Change Planning Practice Guidance[2] (FRCC-PPG).

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 Darlington authority area to inform the application of the Sequential Test.

Darlington Borough Council (DBC) requires 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 provide the evidence base for the Local Planning Authorities' (LPA) new Local Plan.

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

The aims and objectives of this Level 1 SFRA, including those advised in the NPPF (2018) and FRCC-PPG, are:

- To update on the previous 2009 SFRA using new or updated flood risk information including climate change allowances, where available.
- 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 LPA 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.
- Inform the Sustainability Appraisal of the Local Plan, so that flood risk is fully taken into account when considering allocation options and in the preparation of plan policies, including policies for flood risk management to ensure that flood risk is not increased.
- Apply the Sequential Test and, where necessary, the Exception Test when determining land use allocations; safeguarding land from development that is required for current and future flood management.
- Using opportunities offered by new development to reduce the causes and impacts of flooding.
- Identify the requirements for site-specific flood risk assessments in particular locations, including those at risk from sources other than river flooding.
- Consider opportunities to reduce flood risk to existing communities and developments through better management of surface water, provision for conveyance and of storage for flood water. To present a thorough and updated understanding of flood risk, based on up-to-date Environment Agency modelling.
- To reflect current national policy and legislation including the NPPF and FRCC-PPG to enable the LPA to meet their statutory obligations in relation to flood risk.
- To identify any cross-boundary flooding issues and work collaboratively with all relevant Risk Management Authorities (RMA).
- To adopt a catchment based approach to flood risk assessment and management to help inform potential catchment-wide approaches and solutions to flood risk management.
- To take into account any specific requirements of the LPA and LLFA.
- To make recommendations on the suitability of potential development sites, as an evidence base for local plan making.
- To identify land required for current and future flood management that should be safeguarded as set out in the NPPF.

1 https://www.gov.uk/government/publications/national-planning-policy-framework--2

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

- To assist the Council in identifying specific areas where further and more detailed flood risk data and assessment work may be required, but taking into account the surface water management plans and other assessments already undertaken.
- To provide guidance for developers and local authority planning officers on planning requirements in relation to flood risk.
- To consider a precautionary approach to climate change, using the EA's February 2016 allowances where available.
- To provide guidance for developers and planning officers on planning requirements.
- To pay particular attention to surface water flood risk, using the Environment Agency's (EA's) third generation Risk of Flooding from Surface Water (RoFSW) dataset.
- To provide a reference document (this report) to which all parties involved in development planning and flood risk can reliably turn to for initial advice and guidance.
- To develop a report that forms the basis of an informed development management process that also provides guidance on the potential risk of flooding associated with future planning applications.
- To provide a suite of interactive GeoPDF flood risk maps illustrating the interaction between flood risk and potential development sites.

A number of DBC's potential development sites are shown to be at varying risk from fluvial (Table 1-1), surface water (Table 1-2) flooding 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 Flood Map for Planning Flood Zones

Site type	Number of sites within…			
	Flood Zone 1*	Flood Zone 2	Flood Zone 3a	Flood Zone 3b
Residential	40	11	9	8
Employment	25	4	4	2
Mixed use	4	2	2	1
TOTAL	**69**	**17**	**15**	**11**
*Sites with 100% area within Flood Zone 1				

Table 1-2: Number of allocated sites within surface water flood zones

Site type	RoFSW flood zone		
	High risk (1 in 30)	Medium risk (1 in 100)	Low risk (1 in 1000)
Residential	29	32	39
Employment	26	28	29
Mixed use	6	6	6
Total	**61**	**65**	**74**

Development viability assessments for all potential sites are summarised through a number of strategic recommendations within this report and the Development Sites Assessment spreadsheet in Appendix B (see Table 1-3). 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;
- 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 1-3: Number of sites per strategic recommendation

Site/proposed use	Strategic Recommendation				
	A	B	C	D	E
Residential	4	0	30	8	9
Employment	1	0	1	27	0
Mixed use	0	1	3	2	0
Total	**5**	**1**	**34**	**37**	**9**

Included within this Level 1 SFRA, along with this main report, are:

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

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Abbreviations

ABD ..... Areas Benefitting from Defences
ACD ..... Area of Critical Drainage
AEP ..... Annual Exceedance Probability
AIMS ..... Asset Information Management System
AStGWF ..... Areas Susceptible to Groundwater Flooding
CaBA ..... Catchment Based Approach
CC ..... Climate change
CCA ..... Civil Contingencies Act
CDA ..... Critical Drainage Area
CFMP ..... Catchment Flood Management Plan
CIL ..... Community Infrastructure Levy
CSO ..... Combined Sewer Overflow
DBC ..... Darlington Borough Council
DCLG ..... Department for Communities and Local Government
DPD ..... Development Plan Documents
DTM ..... Digital Terrain Model
EA ..... Environment Agency
FAA ..... Flood Alert Area
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
GI ..... Green Infrastructure
GIS ..... Geographical Information Systems
HFM ..... Historic Flood Map
IDB ..... Internal Drainage Board
LA ..... Local 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
NPPF	National Planning Policy Framework
NW	Northumbrian Water
PCPA	Planning and Compulsory Purchase Act
PFRA	Preliminary Flood Risk Assessment
RBD	River Basin District
RBMP	River Basin Management Plan
RFCC	Regional Flood and Coastal Committee
RoFSW	Risk of Flooding from Surface Water map
RMA	Risk Management Authority
RoFRS	Risk of Flooding from Rivers and the Sea map
SA	Sustainability Appraisal
SBC	Stockton-on-Tees Borough Council
SEA	Strategic Environmental Assessment
SFRA	Strategic Flood Risk Assessment
SHLAA	Strategic Housing Land Availability Assessment
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
UKCP18	UK Climate Projections 2018
WFD	Water Framework Directive

1 Introduction

1.1 Commission

Darlington Borough Council (DBC) commissioned JBA Consulting by a letter dated 1st October 2017 for the undertaking of a Level 1 Strategic Flood Risk Assessment (SFRA) to update the existing Level 1 SFRA carried out in 2009. Stockton-on-Tees Borough Council (SBC), has a contract with DBC to carry out certain duties of the Flood and Water Management Act (FWMA) that the Lead Local Flood Authorities (LLFAs) have to discharge. SBC provides advice on; planning applications as per the statutory consultee role, flood risk and land drainage, general assistance with issues relating to flood risk and SBC investigate flood incidents either through the statutory duty or as otherwise requested by DBC. DBC, as LLFA and the Local Planning Authority (LPA), requires this updated 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 using the most up-to-date information and guidance. This will help to inform and provide the evidence base for the Council's new Local Plan.

1.2 Darlington Level 1 SFRA

This SFRA has been carried out in accordance with Government's latest development planning guidance including the National Planning Policy Framework (NPPF) (2018) and flood risk and planning guidance called the Flood Risk and Coastal Change Planning Practice Guidance[3] (FRCC-PPG). The latest guidance, at the time of writing, is available online via:

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

A revised version of the NPPF was published on 24 July 2018 and sets out Government's planning policies for England and how these are expected to be applied. This revised Framework replaces the previous NPPF published in March 2012. The online searchable version of the revised NPPF is not available at the time of writing, however a pdf version can be downloaded via:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/728643/Revised_NPPF_2018.pdf

This SFRA assesses the spatial distribution of flood risk across the local authority area and provides the discussion and guidance required 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 allocation sites identified by DBC which acts as the Local Planning Authority (LPA) and Stockton-on-Tees Borough Council which acts as the Lead Local Flood Authority (LLFA). The SFRA appendices contain interactive GeoPDF maps showing the potential development sites overlaid with the latest, readily available, gathered flood risk information along with a Development Site Assessment spreadsheet indicating the level of flood risk to each site following a strategic assessment of risk. This information will allow the LPA to identify the strategic development options that may be applicable to each site and to inform on the application of the Sequential Test.

1.3 Aims and Objectives

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

- To update on the previous 2009 SFRA using new or updated flood risk information including climate change allowances, where available.
- 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 LPA 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.

3 https://www.gov.uk/guidance/flood-risk-and-coastal-change

- Inform the Sustainability Appraisal of the Local Plan, so that flood risk is fully taken into account when considering allocation options and in the preparation of plan policies, including policies for flood risk management to ensure that flood risk is not increased.
- Apply the Sequential Test and, where necessary, the Exception Test when determining land use allocations; safeguarding land from development that is required for current and future flood management.
- Using opportunities offered by new development to reduce the causes and impacts of flooding.
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- To reflect current national policy and legislation including the NPPF and FRCC-PPG to enable the LPA to meet their statutory obligations in relation to flood risk.
- To identify any cross-boundary flooding issues and work collaboratively with all relevant Risk Management Authorities (RMA).
- To adopt a catchment based approach to flood risk assessment and management to help inform potential catchment-wide approaches and solutions to flood risk management.
- To take into account any specific requirements of the LPA and LLFA.
- To make recommendations on the suitability of potential development sites, as an evidence base for local plan making.
- To identify land required for current and future flood management that should be safeguarded as set out in the NPPF.
- To assist the Council in identifying specific areas where further and more detailed flood risk data and assessment work may be required but taking into account the surface water management plans and other assessments already undertaken.
- To provide guidance for developers and local authority planning officers on planning requirements in relation to flood risk.
- To consider a precautionary approach to climate change, using the EA's February 2016 allowances where available.
- To provide guidance for developers and planning officers on planning requirements.
- To pay particular attention to surface water flood risk, using the Environment Agency's (EA's) third generation Risk of Flooding from Surface Water (RoFSW) dataset.
- To provide a reference document (this report) to which all parties involved in development planning and flood risk can reliably turn to for initial advice and guidance.
- To develop a report that forms the basis of an informed development management process that also provides guidance on the potential risk of flooding associated with future planning applications.
- To provide a suite of interactive GeoPDF flood risk maps illustrating the interaction between flood risk and potential development sites.

1.4 SFRA Future Proofing

This SFRA has been developed using the most up-to-date data and information available at the time of submission. The SFRA has been future proofed as far as possible though the reader should always confirm with the source organisation (Darlington Borough Council) that the latest information is being used when decisions concerning development and flood risk are being considered. The FRCC-PPG, alongside the NPPF, is referred to throughout this SFRA, being the current primary development and flood risk guidance information available at the time of the finalisation of this SFRA.

The EA would usually recommend updating an SFRA every three to four years, unless there is a significant flood affecting the area or a change in policy, in which case an immediate review should be undertaken.

This SFRA uses the EA's Flood Map for Planning version issued in August 2017 to assess fluvial and tidal risk to potential development sites. The Flood Map for Planning is updated at quarterly intervals by the EA, as and when new modelling data becomes available. The reader should therefore refer to the online version of the Flood Map for Planning to check whether the flood zones may have been updated since August 2017, via the following link:

https://flood-map-for-planning.service.gov.uk/

2 Study Area

The unitary authority and Borough of Darlington is located in the Tees Valley region of the North East of England. The borough covers an area of 19,747 hectares (ha) and has a population of approximately 106,000 according to the 2011 Census, the majority of whom live in the urban centre of Darlington town itself.

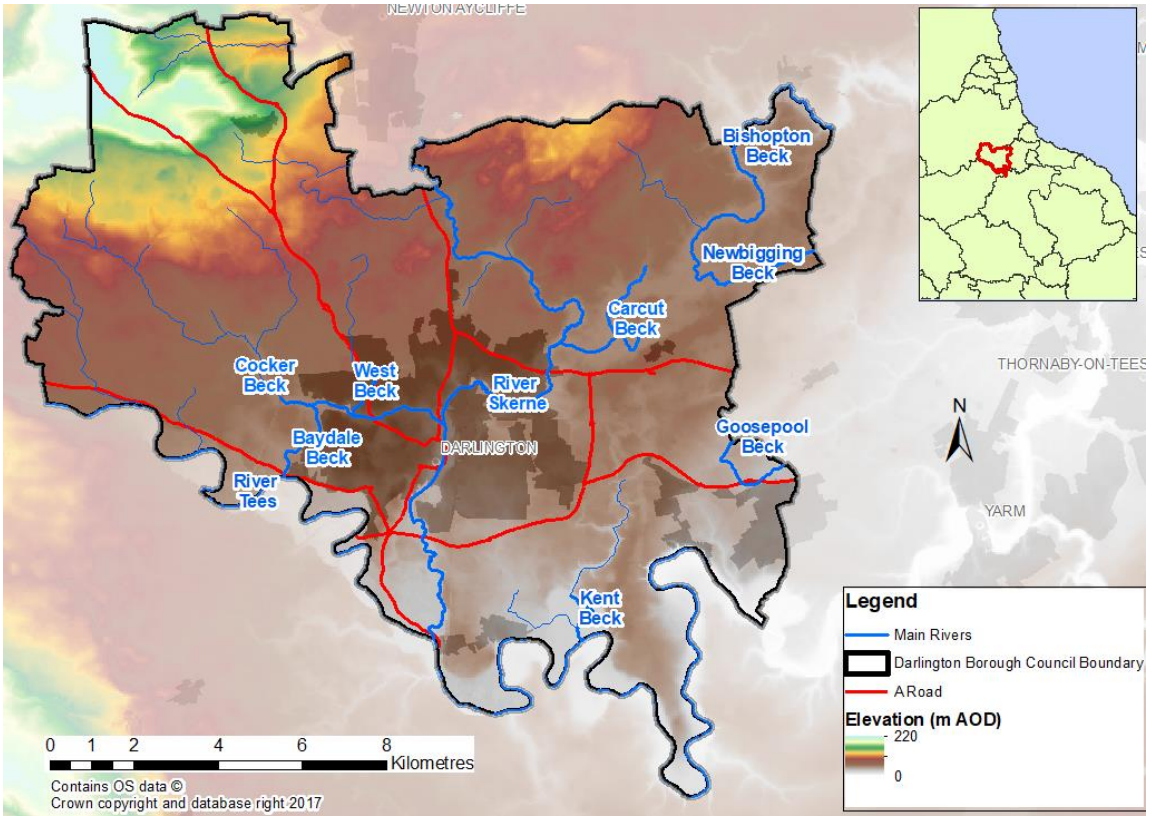
South of Darlington lies the River Tees and North Yorkshire, Teesdale to the west and the former coalfield areas of County Durham lie to the North. To the east of Darlington are the boroughs of Stockton, Middlesbrough, Hartlepool and Redcar and Cleveland, which, along with Darlington, make up the Tees Valley.

The River Tees is the largest watercourse in the area and forms the southern boundary of the borough to Richmondshire and Hambleton. The Tees rises on the eastern slopes of Cross Fell, the highest peak in the Pennines at 893 m. The nature of the River Tees changes as it passes through Darlington. The valley opens out and the river follows a meandering course in an alluvial channel on a broad floodplain. The slope of the channel is gentler than higher up in the catchment and the river only falls 2 m from the town of Darlington to the sea.

The River Skerne, a tributary of the River Tees, is a lowland river over its entire length. There are areas of very flat land adjacent to the main channel and tributaries within the Skerne catchment. Therefore, the flatter areas around the catchment were flooded nearly every winter and the land remains poorly drained throughout the year. Average annual rainfall over the catchment is 800 mm.

The topography of the majority of the borough is relatively flat, though land in the north west reaches around 220 m AOD. The main rivers of Cocker Beck and West Beck flow through the urban centre of Darlington town into the River Skerne, which along with Bishopton Beck, Newbigging Beck, Goosepool Beck, Baydale Beck, Kent Beck and Carcut Beck, drain the higher ground down to the River Tees on the southern boundary.

Figure 2-1: SFRA study area



3 Understanding Flood Risk

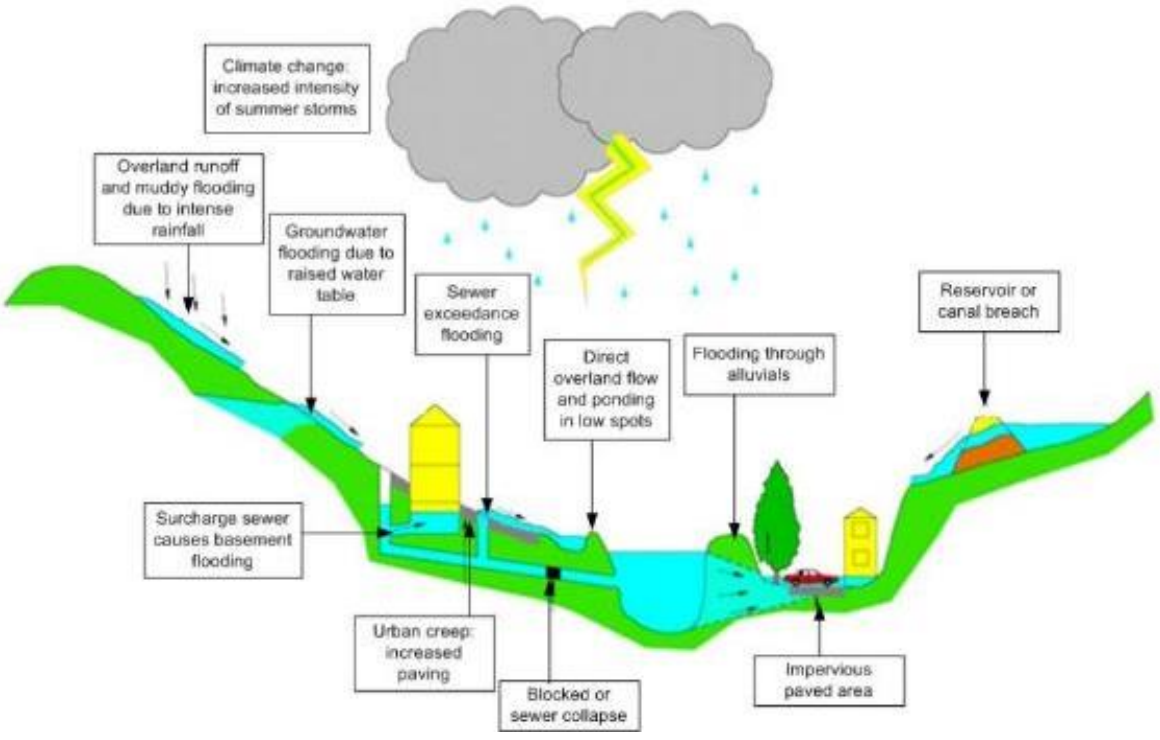
3.1 Sources of Flooding

Flooding is a natural process and can happen at any time in a wide variety of locations. It constitutes a temporary covering of land not normally covered by water and presents a risk when people and human or environmental assets are present in the area that floods. Assets at risk from flooding can include housing, transport and public service infrastructure, commercial and industrial enterprises, agricultural land and environmental and cultural heritage. Flooding can occur from many different and combined sources and in many different ways. Major sources of flooding (also see Figure 3-1) include:

- **Fluvial** (main rivers and ordinary watercourses) - inundation of floodplains from rivers and watercourses; inundation of areas outside the floodplain due to influence of bridges, embankments and other features that artificially raise water levels; overtopping or breaching of defences; blockages of culverts; blockages of flood channels/corridors.
- **Tidal** - sea; estuary; overtopping of defences; breaching of defences; other flows (e.g. fluvial surface water) that could pond due to tide locking; wave action.
- **Surface water** - surface water flooding covers two main sources including direct run-off from adjacent land (pluvial) and surcharging of piped drainage systems (public sewers, highway drains, etc.)
- **Groundwater** - water table rising after prolonged rainfall to emerge above ground level remote from a watercourse; most likely to occur in low-lying areas underlain by permeable rock (aquifers); groundwater recovery after pumping for mining or industry has ceased.
- **Infrastructure failure** - reservoirs; canals; industrial processes; burst water mains; blocked sewers or failed pumping stations.

Different types and forms of flooding present a range of different risks and the flood hazards of speed of inundation, depth and duration of flooding can vary greatly. With climate change, the frequency, pattern and severity of flooding are expected to change and become more damaging.

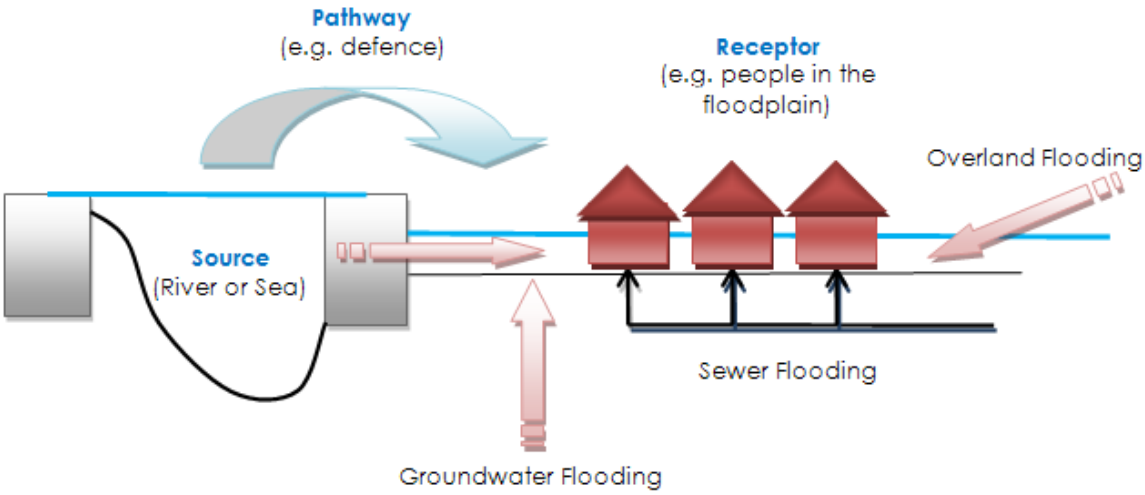
Figure 3-1: Flooding from all sources



3.2 Likelihood and Consequence

Flood risk is a combination of the likelihood of flooding and the potential consequences arising. It is assessed using the source – pathway – receptor model as shown in Figure 3-2 below. This is a standard environmental risk model common to many hazards and should be the starting point of any assessment of flood risk. However, it should be remembered that flooding could occur from many different sources and pathways, and not simply those shown in the illustration below.

Figure 3-2: Source-Pathway-Receptor Model



The principal sources are rainfall or higher than normal sea levels, the most common pathways are rivers, drains, sewers, overland flow and river and coastal floodplains and their defence assets and the receptors can include people, their property and the environment. All three elements must be present for flood risk to arise. Mitigation measures have little or no effect on sources of flooding but they can block or impede pathways or remove receptors.

The planning process is primarily concerned with the location of receptors, taking appropriate account of potential sources and pathways that might put those receptors at risk. It is therefore important to define the components of flood risk in order to apply this guidance in a consistent manner.

3.2.1 Likelihood

Likelihood of flooding is expressed as the percentage probability based on the average frequency measured or extrapolated from records over a large number of years. A 1% probability indicates the flood level that is expected to be reached on average once in a hundred years, i.e. it has a 1% chance of occurring in any one year, not that it will occur once every hundred years. Table 3-1 provides an example of the flood probabilities used to describe the fluvial and tidal flood zones as defined in the FRCC-PPG and as used by the EA in their Flood Map for Planning (Rivers and Sea).

Note that the flood zones shown on the Flood Map for Planning do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding. The Flood Map for Planning can be accessed via:

https://flood-map-for-planning.service.gov.uk/

Table 3-1: NPPF Flood Zones[4]

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or Land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)
Zone 3b The Functional Floodplain	**This zone comprises land where water has to flow or be stored in times of flood.** Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

Considered over the lifetime of development, such an apparently low frequency or rare flood has a significant probability of occurring. For example:

- A 1% flood has a 26% (1 in 4) chance of occurring at least once in a 30-year period - the period of a typical residential mortgage
- And a 49% (1 in 2) chance of occurring in a 70-year period - a typical human lifetime

3.2.2 Consequence

The consequences of flooding include fatalities, property damage, disruption to lives and businesses, with severe implications for people (e.g. financial loss, emotional distress, health problems). Consequences of flooding depend on the hazards caused by flooding (depth of water, speed of flow, rate of onset, duration, wave-action effects, water quality) and the vulnerability of receptors (type of development, nature, e.g. age-structure, of the population, presence and reliability of mitigation measures etc.). Flood risk is then expressed in terms of the following relationship:

Flood risk = Probability of flooding x Consequences of flooding

3.3 Risk

Flood risk is not static; it cannot be described simply as a fixed water level that will occur if a river overtops its banks or from a high spring tide that coincides with a storm surge. It is therefore important to consider the continuum of risk carefully. Risk varies depending on the severity of the event, the source of the water, the pathways of flooding (such as the condition of flood defences) and the vulnerability of receptors as mentioned above.

3.3.1 Actual Risk

This is the risk 'as is' taking into account any flood defences that are in place for extreme flood events (typically these provide a minimum Standard of Protection (SoP)). Hence, if a settlement lies behind a fluvial flood defence that provides a 1 in 100-year SoP then the actual risk of flooding from the river in a 1 in 100-year event is generally low. However, the residual risk may be high in that the impact of flood defence failure would likely have a major impact.

Actual risk describes the primary, or prime, risk from a known and understood source managed to a known SoP. However, it is important to recognise that risk comes from many different sources and that the SoP provided will vary within a river catchment. Hence, the actual risk of flooding from the river may be low to a settlement behind the defence but moderate from surface water,

4 Table 1: Flood Zones, Paragraph 065 of the Flood Risk and Coastal Change Planning Practice Guidance

which may pond behind the defence in low spots and is unable to discharge into the river during high water levels.

3.3.2 Residual Risk

Defended areas, located behind EA flood defences, remain at residual risk as there is a risk of overtopping or defence breach during significant flood events. Whilst the potential risk of failure may be reduced, consideration of inundation and the impact on development needs to be considered.

Paragraph 041 of the FRCC-PPG defines residual risk as:

"…those remaining after applying the sequential approach to the location of development and taking mitigating actions. Examples of residual flood risk include:

- *The failure of flood management infrastructure such as a breach of a raised flood defence, blockage of a surface water conveyance system, overtopping of an upstream storage area, or failure of a pumped drainage system;*
- *failure of a reservoir, or;*
- *a severe flood event that exceeds a flood management design standard, such as a flood that overtops a raised flood defence, or an intense rainfall event which the drainage system cannot cope with.*

Areas behind flood defences are at particular risk from rapid onset of fast-flowing and deep water flooding, with little or no warning if defences are overtopped or breached."

Even when flood defences are in place, there is always a likelihood that these could be overtopped in an extreme event or that they could fail or breach. Where there is a consequence to that occurrence, this risk is known as residual risk. Defence failure can lead to rapid inundation of fast flowing and deep floodwaters, with significant consequences to people, property and the local environment behind the defence. Whilst the actual risk of flooding to a settlement that lies behind a fluvial flood defence that provides a 1 in 100-year SoP may be low, there will always be a residual risk from flooding if these defences overtopped or failed that must be taken into account. Because of this, it is never appropriate to use the term "flood free".

Developers must be able to demonstrate that development will be safe for the entirety of its existence. To that end, Paragraph 042 of the FRCC-PPG states:

"Where residual risk is relatively uniform, such as within a large area protected by embanked flood defences, the Strategic Flood Risk Assessment should indicate the nature and severity of the risk remaining, and provide guidance for residual risk issues to be covered in site-specific flood risk assessments. Where necessary, local planning authorities should use information on identified residual risk to state in Local Plan policies their preferred mitigation strategy in relation to urban form, risk management and where flood mitigation measures are likely to have wider sustainable design implications".

4 The Planning Framework and Flood Risk Policy

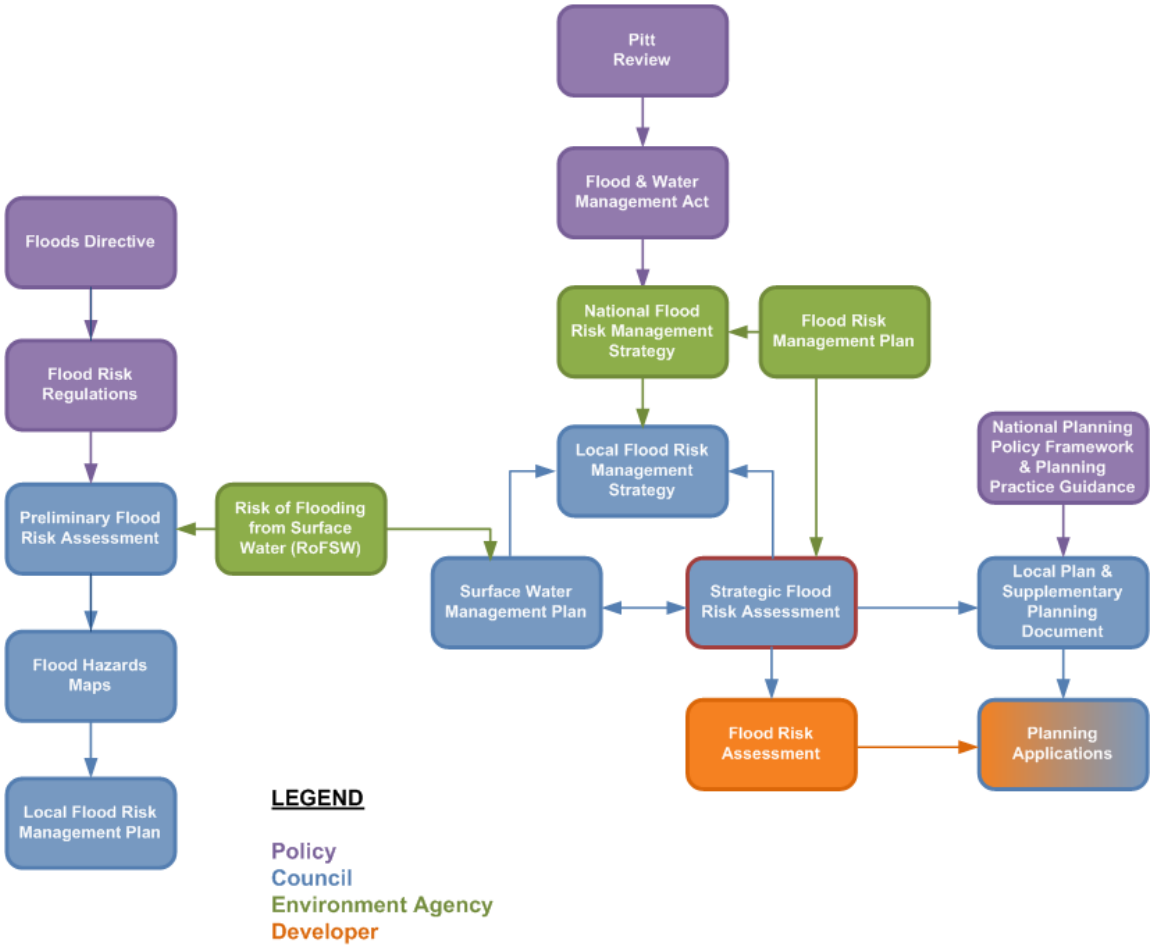
4.1 Introduction

The main purpose of this section of the SFRA is to provide an overview of the key planning and flood risk policy documents that have shaped the current planning framework. This section also provides an overview and context of the LLFA's and LPA's responsibilities and duties in respect to managing local flood risk including but not exclusive to the delivery of the requirements of the Flood Risk Regulations (FRR) 2009 and the Flood and Water Management Act (FWMA) 2010.

Figure 4-1 illustrates the links between legislation, national policy, statutory documents and assessment of flood risk. The figure shows that whilst the key pieces of legislation and policy are separate, they are closely related and their implementation should aim to provide a comprehensive and planned approach to asset record keeping and improving flood risk management within communities.

It is intended that the non-statutory SWMPs and SFRAs can provide much of the base data required to support the delivery of the LLFA's statutory flood risk management tasks as well supporting local authorities in developing capacity, effective working arrangements and informing Local Flood Risk Management Strategies (LFRMS) and Local Plans, which in turn help deliver flood risk management infrastructure and sustainable new development at a local level. This SFRA should be used to support the LPA's Local Plan and to help inform planning decisions.

Figure 4-1: Key documents and strategic planning links with flood risk



4.2 Legislation

4.2.1 EU Floods Directive & the Flood Risk Regulations

The European Floods Directive (2007) sets out the EU's approach to managing flood risk and aims to improve the management of the risk that floods pose to human health, the environment, cultural heritage and economic activity. The Directive was translated into English law by the Flood Risk Regulations which require LLFAs and the EA to produce Flood Risk Management Plans (FRMPs).

The Directive puts in place a six year cycle of producing Preliminary Flood Risk Assessments (PFRAs) with the aim of identifying significant Flood Risk Areas; preparing flood hazard and risk maps; and preparing Flood Risk Management Plans (FRMPs). The first six year cycle was completed in December 2015 and the second six year cycle is currently underway.

Figure 4-2: EU Floods Directive

PFRAs should cover the entire LLFA area for local flood risk (focusing on ordinary watercourses, surface water and groundwater flooding). Where significant Flood Risk Areas are identified using the national approach (and locally reviewed), the LLFA is then required to undertake flood risk hazard mapping and to produce Flood Risk Management Plans as illustrated in Figure 4-2. FRMPs are also completed for each River Basin District in England and Wales by the EA.

The FRMP should consider objectives for flood risk management (reducing the likelihood and consequences of flooding) and measures to achieve those objectives. Significant Flood Risk Areas were not identified in Darlington therefore the LLFA was not required to produce a FRMP. A FRMP was however completed by the EA for Northumbria river basin district. See Section 4.2.4.

The EA has implemented one of the exceptions for creating PFRAs, etc. for Main Rivers and coastal flooding, as they already have mapping (i.e. EA Flood Map for Planning (Rivers and Sea), Risk of Flooding from Rivers and Sea Map) and plans (i.e. CFMPs, SMPs) in place to deal with this. The EA has therefore focused their efforts on assisting LLFAs through this process.

4.2.2 Darlington Preliminary Flood Risk Assessments 2011 and 2017

The first cycle PFRA for Darlington was submitted to the EA in June 2011. The PFRA provides a high level overview of local flood risk, from sources including surface water, groundwater and ordinary watercourses.

As explained previously, the PFRA process is cyclical and the second cycle PRFA, reviewed during 2017 used all relevant current flood risk data and information to update the 2011 version, and was agreed with the EA in December 2017. There has been no change to the assessment of risk in the borough of Darlington since the previous 2011 PFRA.

The PFRA methodology, based on the EA's Final PFRA Guidance and DEFRA's Guidance on selecting Flood Risk Areas, did not identify any Flood Risk Areas within Darlington. It identifies areas that have a history of flooding within the borough, namely Neasham, Pieremont, Town Centre/Town Centre Fringe along the Rivers Tees, Skerne and Cocker and West Beck. Using the EA's 1 km grid square assessment, approximately 78 properties are at risk in the West Beck catchment from the 1% AEP flood event. However, this falls below the threshold of 30,000 required for it to be identified as Flood Risk Areas. DBC was therefore not required to produce flood hazard maps, flood risk maps and flood risk management plans for that area.

The analysis of surface water in 2011, using the EA's second generation Flood Map for Surface Water (FMfSW), revealed the number of properties at risk from surface water flooding in Darlington at the different flood event and depths, shown in Table 4-1 Risk from Surface Water in Darlington.

Table 4-1 Risk from Surface Water in Darlington (according to 2011 PFRA)[5]

Model	Estimated Properties at Risk
30 year (0.1m)	450
30yr deep (0.3m)	25
200 year (0.1m)	2000
200 deep (0.3m)	300

The PFRA still recognised the need to produce a LFRMS for the area however, as part of DBCs obligations as a LLFA under the Flood and Water Management Act. See Section 4.7.4.

4.2.3 Catchment Flood Management Plans (CFMP)

The CFMPs were carried out by the EA in 2008 and were designed to establish flood risk management policies which will deliver sustainable flood risk management for the long term. The CFMPs were used by the EA to help direct resources to where the areas of greatest risk.

The CFMPs contain useful information about how the catchments work, previous flooding and the sensitivity of the river systems to increased rainfall. The EA draw on the evidence and previous measures and proposals set out in the CFMPs to help develop the FRMPs for RBDs. Darlington is included within the Tees CFMP[6].

4.2.4 Flood Risk Management Plans

Following on from the Catchment Flood Management Plans (CFMPs), completed in 2008, Flood Risk Management Plans are designed to set out the risk of flooding from rivers, sea, surface water, groundwater and reservoirs within each River Basin District (RBD) and to detail how Risk Management Authorities will work with communities to manage flood risk up to 2021 for this cycle. Both the River Basin Management Plans (RBMP) and FRMPs have been developed by the EA in tandem to ensure that flood defence schemes can provide wider environmental benefits during the same six-year cycle. Both flood risk management and river basin planning form an important part of a collaborative and integrated approach to catchment planning for water. Each EU member country must produce FRMPs as set out in the EU Floods Directive 2007.

Northumbria RBD Flood Risk Management Plan

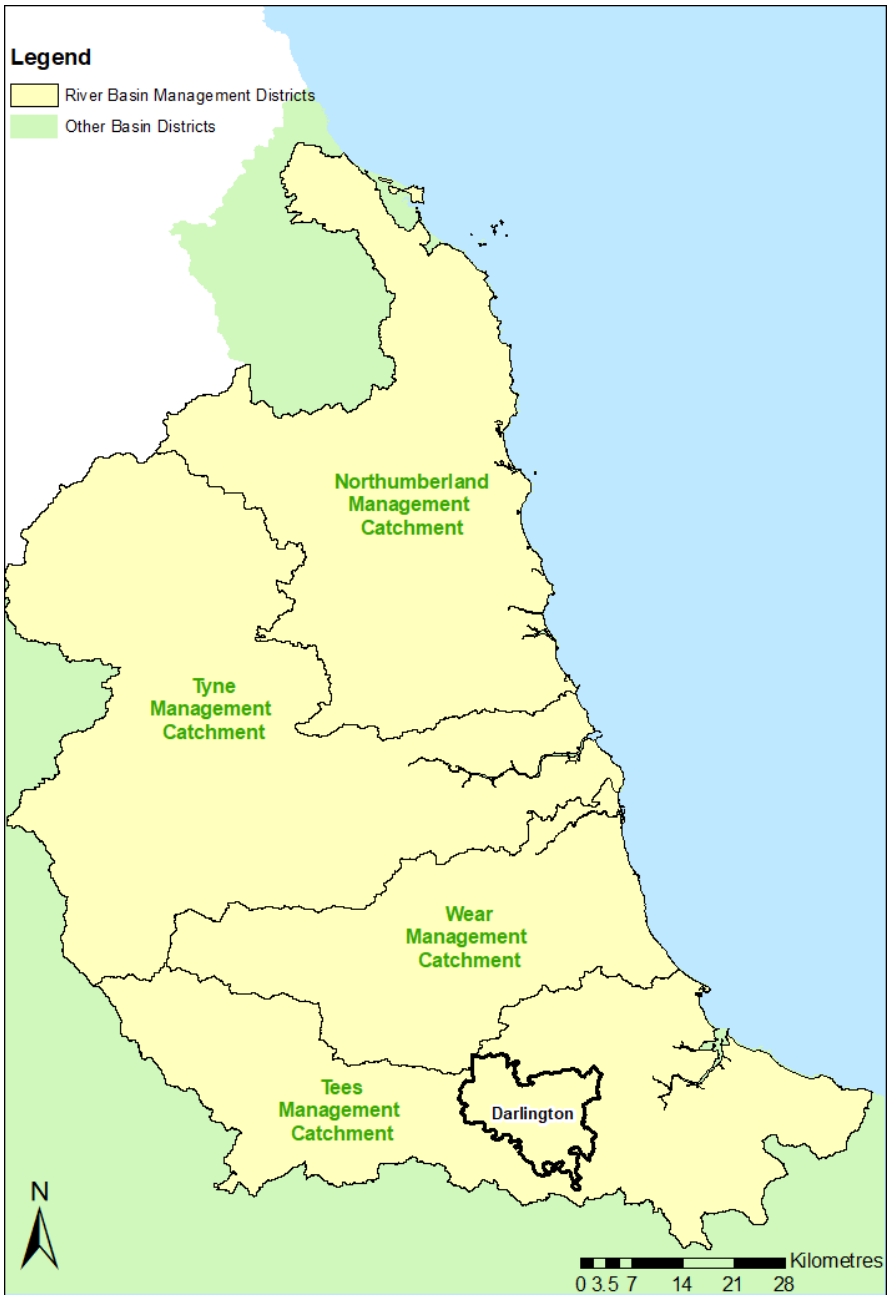
Darlington is within the Northumbria River Basin District which covers an area of 9,029 km^2 and four catchments containing 2.78 million people. There are almost 13,000 people at high risk of surface water flooding (more than a 1 in 30 chance of being flooded in any year) and over 6,000 people are at high risk of flooding from rivers and sea with a high 1 in 30 chance of being flooded in any one year, within the Northumbria RBD[7]. Figure 4-3 shows all the catchments within the Northumbria RBD. Darlington is completely within the River Tees Catchment.

5 Darlington Borough Council. Preliminary Flood Risk Assessment report (PFRA). 2011

6 https://www.gov.uk/government/publications/river-tees-catchment-flood-management-plan

7 Northumbria River Basin District Flood Risk Management Plan 2015-2021, PART B – Sub Areas in the Northumbria River Basin District, March 2016

Figure 4-3: Overview of Northumbria RBD catchments



River Tees Catchment

The River Tees is a predominately rural catchment located in the North East of England, however the main consequences of flooding occur in the urban areas of the catchment including the areas of Darlington, Hartlepool, Middlesbrough and Stockton on Tees. The Tees drains the eastern slopes of Cross Fell in the Pennines and flows eastward to the North Sea[8]. Flood risk management Policies within the River Tees catchment, upstream of Darlington, will have an impact on flood risk within Darlington.

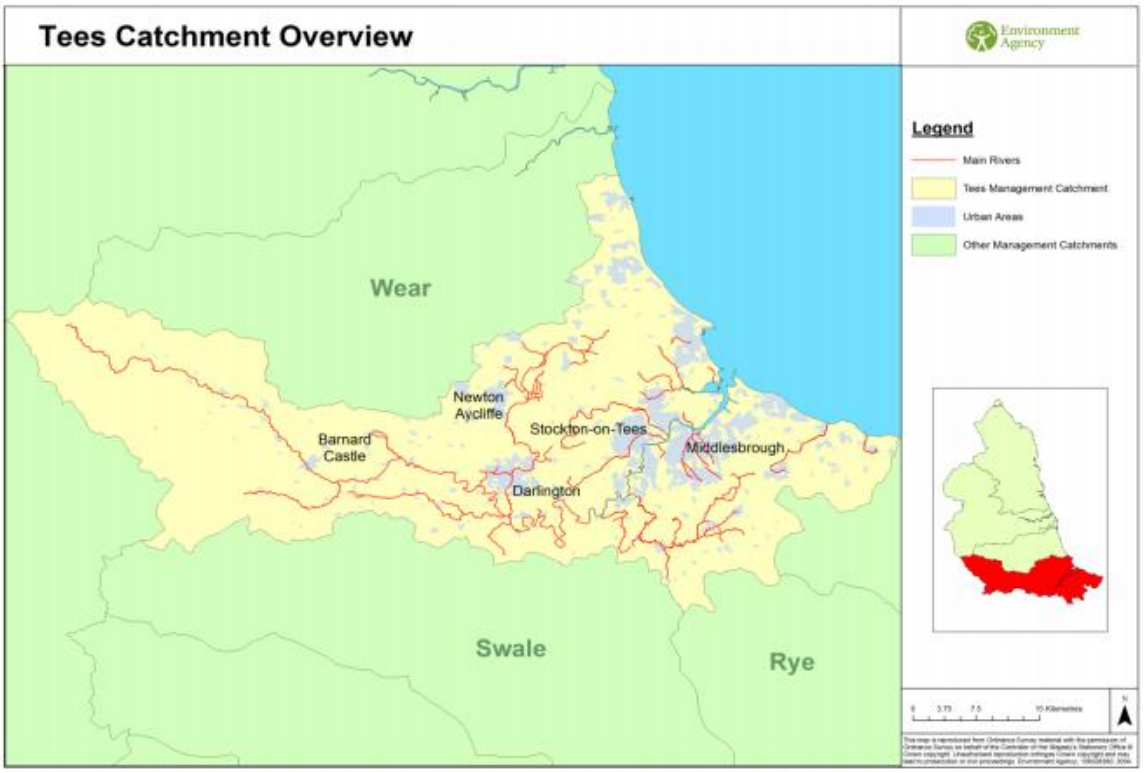
Figure 4-4, extracted from the Northumbria RBD FRMP, provides an overview of the River Tees catchment.

8 Northumbria River Basin District Flood Risk Management Plan 2015-2021. Part B. 2016

The risk of flooding varies through the catchment with the changing character of the landscape and land use. Although there is a rapid, high volume of runoff from the upper part of the Tees, there are a low number of properties at risk of flooding. The Middle Tees catchment contains large areas of natural floodplain meaning flood waters can flow into these large floodplain areas which helps to reduce flows to downstream areas such as Darlington. The main risk areas in the Lower Tees are around Darlington and Stockton. Problems in this area are exacerbated both by high tides and by the series of urban rivers that drain into the Tees Estuary.

Other sources of flooding from reservoirs, ordinary watercourses, groundwater and sewers are also significant in this catchment. The Risk of Flooding from Surface Water map (December 2013) shows a widespread problem. There have been many reported incidents in recent years of these types of problems affecting householders and businesses.

Figure 4-4: River Tees catchment (Northumbria RBD FRMP)



The Northumbria RBD FRMP summarised various measures to help manage flood risk in the Tees catchment. Those that may apply to Darlington include:

- Prevention of risk:
  - Undertake an assessment to identify culverts which may be removed to reduce flood risk in the West Beck area and Lower Tees
  - Seek opportunities to provide additional floodplain storage upstream of Darlington Develop a Flood Risk Management Tool Kit of useful information and advice to support communities in managing flood risk
  - Seek opportunities to restore Peat Bogs to reduce flood risk on the Lower Tees areas
- Preparation for risk:
  - Assessing Flood Risk to infrastructure and developing emergency plans for them to ensure that they are resilient to flood risk
  - Establishing and maintaining a register for flood risk assets to ensure that they are identified and maintained by the LLFA

- Develop and maintain local and multi-agency flood plans to ensure areas are prepared for flooding

- Protection from risk:
  - Improve floodplain usage in the upper catchments reducing flood flows in the lower catchments throughout the Rivers Tees and Skerne by assessing redundant flood banks to allow the river channel process to operate naturally within the catchment as there is little natural floodplain storage in the upper catchment.

4.2.5 Flood & Water Management Act

The Flood and Water Management Act (FWMA) was passed in April 2010. It aims to improve both flood risk management and the way we manage our water resources.

The FWMA has created clearer roles and responsibilities and helped to define a more risk-based approach to dealing with flooding. This included the creation of a lead role for LAs, as LLFAs, designed to manage local flood risk (from surface water, ground water and ordinary watercourses) and to provide a strategic overview role of all flood risk for the EA.

The content and implications of the FWMA provide considerable opportunities for improved and integrated land use planning and flood risk management by LAs and other key partners. The integration and synergy of strategies and plans at national, regional and local scales, is increasingly important to protect vulnerable communities and deliver sustainable regeneration and growth. Table 4-2: Key LLFA Duties under the FWMA provides an overview of the key LLFA responsibilities under the FWMA.

Table 4-2: Key LLFA Duties under the FWMA

FWMA Responsibility	Description of duties and powers	LLFA Status
Local Strategy for Flood Risk Management	The LLFA has a duty to develop, maintain, apply and monitor a local strategy for flood risk management in its area. The local strategies will build on information such as national risk assessments and will use consistent risk based approaches across different LA areas and catchments. The local strategy will not be secondary to the national strategy; rather it will have distinct objectives to manage local flood risks important to local communities.	Draft - May 2016**Error! Reference source not found.**
Duty to contribute to sustainable development	The LLFA has a duty to contribute towards the achievement of sustainable development.	Ongoing
Duty to comply with national strategy	The LLFA has a duty to comply with national flood and coastal risk management strategy principles and objectives in respects of its flood risk management functions.	Ongoing
Investigating Flood Incidents	The LLFA, on becoming aware of a flood in its area, has (to the extent it considers necessary and appropriate) to investigate and record details of "locally significant" flood events within their area. This duty includes identifying the relevant risk management authorities and their functions and how they intend to exercise those functions in response to a flood. The responding risk management authority must publish the results of its investigation and notify any other relevant	Ongoing

FWMA Responsibility	Description of duties and powers	LLFA Status
	risk management authorities.	
Asset Register	A LLFA has a duty to maintain a register of structures or features, which it considers to have a significant effect on flood risk, including details on ownership and condition as a minimum. The register must be available for inspection and the Secretary of State will be able to make regulations about the content of the register and records. SBC do not carry out any structural inspections for DBC.	All existing assets mapped. http://public.gismapp.com/darlington The Asset Register is an on-going project with watercourse inspections being carried out when conditions are appropriate
Duty to co-operate and Powers to Request Information	The LLFA must co-operate with other relevant authorities in the exercise of their flood and coastal erosion management functions.	Ongoing
Ordinary Watercourse Consents	The LLFA has a duty to deal with enquiries and determine watercourse consents where the altering, removing or replacing of certain flood risk management structures or features that affect flow on ordinary watercourses is required. It also has provisions or powers relating to the enforcement of unconsented works.	Ongoing
Works Powers	The Act provides a LLFA with powers to undertake works to manage flood risk from surface runoff, groundwater and on ordinary watercourses, consistent with the local flood risk management strategy for the area.	Ongoing
Designation Powers	The Act provides a LLFA with powers to designate structures and features that affect flooding or coastal erosion. The powers are intended to overcome the risk of a person damaging or removing a structure or feature that is on private land and which is relied on for flood or coastal erosion risk management. Once a feature is designated, the owner must seek consent to alter, remove, or replace it.	Ongoing
Emergency Planning	A LLFA is required to play a lead role in emergency planning and recovery after a flood event.	County Durham and Darlington Local Resilience Forum (Section 7.1.1)
Community Involvement	A LLFA should engage local communities in local flood risk management issues. This could include the training of community volunteers, the development of local flood action groups and the preparation of community flood plans, and general awareness raising around roles and responsibilities plans.	County Durham and Darlington Community Risk Register County Durham and Darlington Emergency Plan (See Section 7)
Planning Requirements for SuDS	Sustainable Drainage Systems (SuDS) are a planning requirement for major planning applications of 10 or more residential units or equivalent commercial development schemes with sustainable drainage. The LLFA is now a statutory planning consultee and it will be between	Tees Valley Authorities Local Standards for Sustainable Drainage[9] CIRIA SuDS Manual[10]

9 Tees Valley Authorities Local Standards for Sustainable Drainage. July 2015

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

FWMA Responsibility	Description of duties and powers	LLFA Status
	the LPA and the LLFA to determine the acceptability of these proposed sustainable drainage schemes subject to exemptions and thresholds. Approval must be given before the developer can commence construction. Planning authorities should use planning conditions or obligations to make sure that arrangements are in place for ongoing maintenance of any SuDS over the lifetime of the development.	
Latest changes to FWMA legislation[11]		

4.3 Flood and water focused policies and plans

4.3.1 25 Year Environment Plan[12]

This Plan sets out government action to help the natural world regain and retain good health. It aims to deliver cleaner air and water in our cities and rural landscapes, protect threatened species and provide richer wildlife habitats. It calls for an approach to agriculture, forestry, land use and fishing that puts the environment first. The Plan also sets out how government will tackle the effects of climate change, considered to perhaps be the most serious long-term risk to the environment given higher land and sea temperatures, rising sea levels, extreme weather patterns and ocean acidification. The Plan aims to show that government will work with nature to protect communities from flooding, slowing rivers and creating and sustaining more wetlands to reduce flood risk and offer valuable habitats.

Focusing on flood risk, government will look to update the national flood and coastal erosion risk management strategy, looking to strengthen joint delivery across organisations. In terms of funding, government will look at current partnership arrangements ahead of a review of funding needs beyond 2021, seeking to attract more non-public sector investment, and make sure all relevant agencies are able to respond quickly and effectively to support communities if and when flooding does occur. The Plan states that the EA will use its role in statutory planning consultations to seek to make sure that new developments are flood resilient and do not increase flood risk.

For flood mitigation, government will focus on using more natural flood management solutions; increasing the uptake of SuDS, especially in new development; and improving the resilience of properties at risk of flooding and the time it takes them to recover should flooding occur.

11 http://www.legislation.gov.uk/ukpga/2010/29

12 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/673203/25-year-environment-plan.pdf

Figure 4-5: Main goals and policy areas the Plan is intended to help work towards

4.3.2 Water Framework Directive & Water Environment Regulations

The purpose of the Water Framework Directive (WFD), which was transposed into English Law by the Water Environment Regulations (2003), is to deliver improvements across Europe in the management of water quality and water resources through River Basin Management Plans (RBMP). The DBC area is covered by the Northumbria Basin Management Plan, managed by the EA and published in 2015. Water quality and flood risk can go hand in hand in that flood risk management activities can help to deliver habitat restoration techniques. The Northumbria RBMP, 2016, includes such examples whereby land management techniques have been designed to reduce flood risk whilst also reducing sediment loss and improving water quality. The EA is

responsible for monitoring and reporting on the objectives of the WFD on behalf of Government. They work with Government, Ofwat, local government, non-governmental organisations (NGOs) and a wide range of other stakeholders including local businesses, water companies, industry and farmers to manage water[13].

The second management cycle of the WFD[14] has begun and the second RBMPs were completed in 2015, building upon the first set completed in 2009. RBMPs are designed to address the pressures facing the water environment in the river basin management plan districts and the actions that will address them. The plans describe required objectives and measures to protect and improve the water environment over the next 20 years and aim to achieve WFD targets from 2015 onwards to 2021.

The RBMPs, like the CFMPs, are important documents relevant to the development of the SFRA. The SFRA should take into account the wider catchment flood cell aims and objectives and understand how it can potentially contribute to the achievement of them.

The main responsibility for DBC is to work with the EA to develop links between river basin management planning and the development of local authority plans, policies and assessments. In particular, the general programme of actions (measures) within the RBMPs highlight the need for:

- The Tees Valley Water Cycle 2012 includes the Darlington Borough (See Section 4.4.4)
- Water Cycle Studies to promote water efficiency in new development through regional strategies and local development frameworks,
- Surface Water Management Plan implementation,
- Consideration of the WFD objectives (achieving good status or potential as appropriate) in the spatial planning process, including LDDs and Sustainable Community Strategies, and
- Promotion of the wide scale use of Sustainable Drainage Systems (SuDS) in new development.

4.4 Other related plans and policies

4.4.1 Catchment Based Approach (CaBA)

The Catchment Based Approach embeds collaborative working at a river catchment scale to deliver cross cutting improvements to our water environments. The CaBA partnerships drive cost-effective practical delivery on the ground, resulting in multiple benefits including reduced flood risk and resilience to climate change.

Catchment partnerships are groups of organisations with an interest in improving the environment in the local area and are led by a catchment host organisation. The partnerships work on a wide range of issues, including the water environment but also address other concerns that are not directly related to river basin management planning. Government is also working to strengthen or establish partnerships in the areas most affected by the December 2015 floods to encourage a more integrated approach to managing risk across all catchments.

The National Resilience Review will align closely with Defra's work on integrated catchment-level management of the water cycle in the Government's 25 year Environment Plan. Government's aspirations for the next cycle of planning (now to 2021) is for more integrated catchment planning for water, where Flood and Coastal Risk Management, River Basin Management, nature conservation and land management are considered together.

Catchment partnerships relevant to Darlington's LPA include:

- The Tees Catchment Partnership, hosted by the Tees River Trust; and
- The Northumberland Rivers Catchment Partnership, hosted by the Northumbria Rivers Trust

13 https://www.gov.uk/government/publications/2010-to-2015-government-policy-water-quality/2010-to-2015-government-policy-water-quality#appendix-4-planning-for-better-water

14 http://ec.europa.eu/environment/water/water-framework/info/timetable_en.htm

4.5 Planning legislation

4.5.1 Housing and Planning Act, 2016

The Act provides the statutory framework to build more homes that people can afford, expand home ownership, and improve housing management. The Act places a duty on local authorities to promote the development of starter homes, custom and self-build homes. The Act simplifies and speeds up the neighbourhood planning process to support communities that seek to meet local housing and other development needs through neighbourhood planning. In addition, the Act seeks to ensure that every area has a Local Plan, and gives the Secretary of State further powers to intervene if Local Plans are not effectively delivered.

4.5.2 Localism Act

The Localism Act was given Royal Assent in November 2011 with the purpose of shifting power from Central Government back to local councils, communities and individuals. The Government abolished Regional Spatial Strategies, providing the opportunity for councils to re-examine the local evidence base and establish their own local development requirements for employment, housing and other land uses through the plan making process.

Additionally, this act places a duty to cooperate on local authorities, including statutory bodies and other groups, in relation to the planning of sustainable development. This duty to cooperate requires local authorities to:

"...engage constructively, actively and on an ongoing basis in any process by means of which development plan documents are prepared so far as relating to a strategic matter." (Provision 110).

This act, together with the Neighbourhood Planning (General) Regulations 2012, also provides new rights to allow Parish or Town Councils to deliver additional development through neighbourhood planning (Neighbourhood Plans). This means local people can help decide where new homes and businesses should go and what they should look like. Local planning authorities can provide technical advice and support as neighbourhoods draw up their proposals. Neighbourhood Plans have a number of conditions and requirements as set out in the NPPF. Also refer to Paragraph 061-064 of the FRCC-PPG for information on neighbourhood planning and flood risk.

4.6 Planning Policy

4.6.1 National Planning Policy Framework (NPPF), 2018

The revised NPPF was published in July 2018, replacing the previous version published in March 2012. The NPPF sets out Government's planning policies for England and how these are expected to be applied. The Framework is based on core principles of sustainability and forms the national policy framework in England, also accompanied by a number of Planning Practice Guidance (PPG) notes. It must be taken into account in the preparation of local plans and is a material consideration in planning decisions.

The PPG documents will, where necessary, be updated in due course to reflect the changes in the revised NPPF.

Section 14 Paragraph 156 of the revised NPPF states that…

"...Strategic policies should be informed by a strategic flood risk assessment and should manage flood risk from all sources. They should consider cumulative impacts in, or affecting, local areas susceptible to flooding, and take account of advice from the Environment Agency and other relevant flood risk management authorities, such as lead local flood authorities and internal drainage boards."

The Sequential Test must be performed when considering the placement of future development and for planning application proposals. The Sequential Test is used to direct all new development (through the site allocation process) to locations at the lowest probability of flooding. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower risk of flooding. The strategic flood risk assessment will provide the basis for applying this test. The sequential approach should be used in areas known to be at risk now or in the future from any form of flooding.

The key changes in the revised NPPF compared to the 2012 NPPF include:

- **Strategic policies should also now consider the 'cumulative impacts in, or affecting, local areas susceptible to flooding' (para 156), rather than just to or from individual development sites (see Section 6.8);**
- **Future risk from climate change. The 'sequential approach should be used in areas known to be at risk now or in the future from any form of flooding' (para 158) (see Sections 6.10.1, 6.10.2 and Appendix B);**
- **Natural Flood Management. 'Using opportunities provided by new development to reduce the causes and impacts of flooding (where appropriate through the use of natural flood management techniques)' (para 157c) (see Section 5.7.5 and Appendix B);**
- **SuDS. '**Major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate**' (Para 165) (see Section 6.11.1 and Appendix F); and**
- **Emergency planning. Emergency plans are required as part of an FRA that includes the inclusion of safe access and egress routes (para 163e) (Section 7).**

As explained, the FRCC-PPG sits alongside the NPPF and sets out detailed guidance on how this policy should be implemented.

4.6.2 Flood Risk and Coastal Change Planning Practice Guidance (FRCC-PPG)

At the time of writing, the current FRCC-PPG was published on 6 March 2014 and is available online via:

https://www.gov.uk/guidance/flood-risk-and-coastal-change

Following the revision of the NPPF, Government will, where necessary be updating the FRCC-PPG to reflect the changes discussed above in Section 4.6.1. It is advised that any hyperlinks within the FRCC-PPG that direct users to the previous 2012 NPPF should be disregarded.

Whilst the NPPF concentrates on high level national policy, the FRCC-PPG is more detailed. The practice guidance advises on how planning can take account of the risks associated with flooding and coastal change in plan making and the development management process. This is in respect of local plans, SFRAs, the sequential and exception tests, permitted development, site-specific flood risk, Neighbourhood Planning, flood resilience and resistance techniques and the vulnerability of development to make development safe from flooding. As discussed, the FRCC-PPG may in the future be updated in places to reflect the revised NPPF.

4.6.3 Local Plan

A Local Plan[15] is a statutory document prepared in consultation with the local community. It is designed to promote and deliver sustainable development. Local Plans have to set out a clear vision, be kept up to date and to set out a framework for future development of the local area, addressing needs and opportunities in relation to housing, the economy, community facilities and

15 Town and Country Planning, England. The Town and Country Planning (Local Planning) (England) Regulations 2012

infrastructure as well as safeguarding the environment and adapting to climate change and securing good design.

Local plans set the context for guiding decisions and development proposals and along with the NPPF, set out a strategic framework for the long-term use of land and buildings, thus providing a framework for local decision making and the reconciliation of competing development and conservation interests.

The aim of a Local Plan is to ensure that land use changes proceed coherently, efficiently, and with maximum community benefit. Local plans should indicate clearly how local residents, landowners, and other interested parties might be affected by land use change. They are subject to regular periods of intensive public consultation, public involvement, negotiation and approval. The Local Plan should be the starting point when considering planning applications.

The NPPF requires that the evidence base for the Local Plan must clearly set out what is intended over the lifetime of the plan, where and when this will occur and how it will be delivered. The NPPF states that Local Plans should be supported by a SFRA and should take account of advice provided by the EA and other flood risk management bodies. This SFRA should be used to ensure that when allocating land or determining planning applications, development is located in areas at lowest risk of flooding. Policies to manage, mitigate and design appropriately for flood risk should be written into the Local Plan, informed by both this SFRA and the Sustainability Appraisal.

Government guidance on Local Plans can be found via:

https://www.gov.uk/guidance/local-plans--2

4.3.5.1 Darlington Borough Council Local Plan (2016-2036)

The Darlington Local plan is being prepared by the Council at the time of writing, and will look ahead up to the year 2036. The aim of the Local Plan is to establish a planning framework for future development, identifying how much land is available and where such land should be provided for new homes and employment, alongside associated infrastructure.

In April 2016, Cabinet approved various documents as the basis for beginning to prepare, and consult on, a new Local Plan for the Borough. These included the Local Development Scheme (LDS), the Draft Statement of Community Involvement, a Housing Requirement Technical Paper and the Strategic Options 161108 EG Local Plan Report Cabinet 2 of 32 and Scoping Paper.

DBC's emerging Local Plan will consider how the Borough will develop for the next 20 years, up to the year 2036. The Strategic Issues and Scoping Paper[16] (May 2016), was developed in preparation for the new Local Plan. The existing development plan is made up of the documents below, which are used as the basis for determining planning applications:

- Saved Local Plan policies (1997)
- Core Strategy (adopted in 2011)
- Tees Valley Mineral and Waste Core Strategy (adopted 2011)

A Strategic Framework[17], published in November 2016, sets the vision, aims and objectives and will guide the detail of the DBC Local Plan. Relative to flood risk, the Local Plan 2016 - 2036 Strategic Framework states the need to:

- Mitigate flood risks through environmental and ecological improvement of the River Skerne and River Tees
- Manage flood risk for all sources
- Locate development in areas not susceptible to flooding and encourage flood resilient design where necessary.

16 https://microsites.darlington.gov.uk/media/1067/issues-and-scoping-report-may-2016-final-word-doc-print.pdf

17 https://microsites.darlington.gov.uk/media/1239/item-6c-key-decisions-darlington-local-plan2016-36-strategic-framework-annex-5.pdf

4.6.4 Sustainability Appraisal

The Sustainability Appraisal (SA) is a key component of the Local Plan evidence base, ensuring that sustainability issues are addressed during the preparation of local plans. The SA is a technical document which has to meet the requirements of the Strategic Environmental Assessment Directive 2001/42/EC which assesses and reports on a plan's potential impact on the environment, economy, and society. The SA carries out an assessment of the draft policies at various stages throughout the preparation of the Local Plan, and does this by testing the potential impacts, and consideration of alternatives are tested against the plan's objectives and policies. This ensures that the potential impacts from the plan on the aim of achieving sustainable development are considered, in terms of the impacts, and that adequate mitigation and monitoring mechanisms are implemented.

4.4.3.1 DBC Sustainability Appraisal

Relative to flood risk, the draft SA Scoping Report[18], carried out in summer 2016, following the review of relevant plans, policies and programmes, discusses sustainability issues and problems for Darlington that are relevant to the preparation of the Local Plan, namely the high number of potential development sites at some risk of flooding. Flood risk is likely to increase over the next 25 years due to the impacts of climate change. Properties are also at risk in neighbouring authorities downstream of Darlington Borough. The Northumberland Rivers Catchment Partnership have developed proposals to tackle 'urban streams' in SE Northumberland which could involve NFM strategies upstream to mitigate the impacts of flooding downstream of Darlington.

4.7 Flood Risk Management Policy

4.7.1 Darlington Borough Council Level 1 SFRA (December 2009)

In 2009, a Level 1 SFRA was commissioned by DBC in order to review the existing Tees Valley SFRA (2007) and produce a Level 1 SFRA for Darlington alone. This SFRA was prepared in accordance with the now superseded PPS25 and its Practice Guidance. The study analysed current and future flooding issues in order to support the LPA assessment of future development sites, including providing data to inform the application of the Sequential Test.

A number of conclusions were drawn from the report which are still current within this update, including:

- DBC must take a lead role in FRM and continue the work of the Level 1 SFRA
- Increase the understanding and information available on flood risk issues.
- Development of a SWMP. Until this has been completed, all developments identified at risk from surface water flooding should adhere to the guidance in the NPPF and FRCC-PPG and also the recommendations from this SFRA.

4.7.2 Darlington Borough Council Level 2 SFRA (October 2010)

The 2010 Level 2 SFRA provided a greater detail on the flood risk at key development and regeneration sites identified in the Level 1 Assessment. This includes more detail for the Town Centre Fringe sites and the Critical Drainage Areas (CDAs) and follows on from the Level 1 reports. The report provided evidence as to whether these sites can be brought forward for development safely, and subsequently passing the second part of the Exception Test.

The Level 2 report stated that *"SFRAs should identify CDAs and SWMPs and priorities these CDAs and develop a greater understanding and solutions for the surface water flooding issues."*

4.7.3 Tees Valley Scoping Water Cycle Study (2012)

The objective of the Tees Valley Scoping Water Cycle Study (WCS) was to identify any constraints on housing and employment growth planned for the area up to 2026 that may be imposed by the water cycle and how these can be resolved i.e. by ensuring that appropriate water infrastructure is provided to support proposed development. Furthermore, it will provide a strategic approach to

18 https://microsites.darlington.gov.uk/media/1087/draft_sa_scoping_report_final.pdf

the management and use of water which ensures that the sustainability of the water environment in the region is not compromised.

The Scoping WCS carried out as a high level review of potential future development against the Water Cycle, such as water resources, water treatment and supply, wastewater, sewage treatment, flood risk and other environmental considerations.

4.7.4 National and Local Flood Risk Management Strategies

As presented in Figure 4-1 in Section 4.1, the FWMA establishes how flood risk will be managed within the framework of National Strategies for England and Local Strategies for each LLFA area.

The National Strategy for England has been developed by the EA with the support and guidance of Defra. It sets out principles for how flood risk should be managed and provides strategic information about different types of flood risk and which organisations are responsible for their effective management. The FWMA requires risk management authorities (local authorities, EA, sewerage companies and highways authorities) to work together and act consistently with the National Strategy in carrying out their flood and coastal erosion risk management functions effectively, efficiently and in collaboration with communities, businesses and infrastructure operators to deliver more effective flood risk management.

LLFAs have responsibility for developing a LFRMS for their area covering local sources of flooding (see Table 4-2). The local strategy produced must be consistent with the National Strategy. The local strategy should set out the framework for local flood risk management functions and activities and should raise awareness of local organisations with responsibilities for flood risk management in the area. The strategy should also facilitate partnership arrangements to ensure co-ordination between local organisations and an assessment of flood risk and plans and actions for managing risk, as set out under Section 9 of the FWMA.

The following link provides links to guidance for Risk Management Authorities (RMA) and local authorities on various subjects of flood risk management, including tools to support LLFAs in developing their LFRMS:

https://www.gov.uk/guidance/flood-risk-management-information-for-flood-risk-management-authorities-asset-owners-and-local-authorities

4.4.5.1 Darlington Borough Council Local Flood Risk Management Strategy

The DBC LFRMS was published in May 2016. The Strategy sets out how DBC will manage flood risk from surface water runoff, groundwater and ordinary watercourses for which the Borough Council has a responsibility as LLFA, and other types of flooding where local agents can play a supporting role to lead agencies.

The LFRMS has five objectives:

- Improving flood risk to communities severely affect by recent flooding
- Reducing the incidence of surface water flooding
- Ensuring flood risk is managed in new development
- Keeping our highways safe and passable
- Delivering wider benefits

4.7.5 Green Infrastructure Assessments

Open space, or Green Infrastructure (GI), should be designed and managed as a multifunctional resource capable of delivering a wide range of environmental and quality of life benefits for local communities and should be provided as an integral part of all new development, alongside other infrastructure such as utilities and transport networks.

Open space can provide many social, economic and environmental benefits close to where people live and work including:

- Places for outdoor relaxation and play;
- Space and habitat for wildlife with access to nature for people;

- Environmental education;
- Local food production - in allotments, gardens and through agriculture;
- Improved health and well-being – lowering stress levels and providing opportunities for exercise;
- Climate change adaptation - for example flood alleviation and cooling urban heat islands.

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. GI can have an important role to play in reducing the likelihood of flooding by providing space for flood storage, reducing runoff and increasing infiltration, whilst also providing other benefits as stated above.

Alongside GI should be the implementation of SuDS, specifically within potential development sites, where possible. The suitability of GI and SuDS can be informed by this SFRA through utilisation of open space for water in the areas of greatest flood risk, which would be key to helping deliver sustainable development. Examples include:

- Restoration of the natural character of floodplains;
- Keeping and preserving of areas of existing natural floodplain;
- Introduction of new areas and enhancing existing areas of greenspace whilst incorporating sustainable drainage within new development; and
- Reduction of downstream flood risk.

The Town and Country Planning Association together with The Wildlife Trusts produced a guidance document for Green Infrastructure[19]. The guidance states that local plans should identify funding sources for GI and provision should be made for GI to be adequately funded as part of a development's core infrastructure. For new developments, GI assets can be secured from a landowner's 'land value uplift' and as part of development agreements. LPAs may include capital for the purchase, design, planning and maintenance of GI within the Community Infrastructure Levy (CIL) programme.

4.4.7.1 Tees Valley Green Infrastructure Strategy, 2008-2021[20]

Tees Valley Green Infrastructure Strategy, produced in 2008, looked to contribute to environmental sustainability and climate change adaptation through opportunities for improved flood-risk management, air and water quality. The GI was designed to help mitigate, within the Tees Valley, the effects of climate change, promote better public health, create a sense of wellbeing and create an attractive environment to increase the appeal for inward investors for example.

4.4.7.2 Darlington's Green Infrastructure Strategy, 2013-2026[21]

A GI was produced by Darlington Borough Council, which looked to identify all multifunctional green space and other relevant land and watercourses, which supports the activity, health and wellbeing of local people and wildlife across Darlington. The GI recognises the close links with climate change and flood management. DBC developed the Infrastructure Delivery Plan (IDP)[22] based on the findings of the GI Strategy.

The Delivery Plan (November 2010) sets the context for GI work across the borough. Its primary function is to translate the vision for GI, and the more specific priorities identified in the GI Strategy and the Core Strategy, into actions. For example, the Delivery Plan recognises the close links associated with flood management and Darlington.

19 Planning for a Healthy Environment - Good Practice Guidance for Green Infrastructure and Biodiversity, Published by the Town and Country Planning Association and The Wildlife Trusts, July 2012

20 http://teesvalleynaturepartnership.org.uk/wp-content/uploads/2013/11/Tees-Valley-Green-Infrastructure-Strategy.pdf

21 http://www.darlington.gov.uk/media/112674/gi_strategy.pdf

22 http://www.darlington.gov.uk/media/98733/darlington-local-infrastructure-delivery-plan.pdf

4.7.6 Flood Risk Partnerships and Partnership Plans

DBC has been involved in the development of several partnerships designed to provide collaboration between public agencies, businesses and the community. Partnerships and plans that affect the borough include:

- County Durham and Darlington Flood Resilience Forum
- Darlington Partnership with Stockton Borough Council as LLFA
- Cleveland Local Resilience Forum (CLRF)
- Community Risk Register
- Tees Valley Strategic Flood Risk Management Partnership
- Tees Valley Investment Plan
- NWL Liaison Meetings
- Northumbria Regional Flood and Coastal Committee, (NRFCC)
- Inland Liaison Meeting
- Northumbria Integrated Drainage Partnership (NIDP)

See Section 7 on Emergency Planning for more information.

4.8 Roles and Responsibilities

The responsibilities for the Risk Management Authorities (RMA) under the Flood and Water Management Act and the Flood Risk Regulations are summarised below.

4.8.1 EA as a RMA

- Has a strategic overview role for all forms of flooding;
- Has the power to request information from any partner in connection with its risk management functions;
- Must exercise its flood or coastal erosion risk management functions in a manner consistent with the National Strategy and Local Strategies;
- Must be consulted on Local Strategies, if affected by the strategy, by the LLFA;
- Must help advise on sustainable development.

4.8.2 LPA as a RMA

- Has a duty to act in a manner that is consistent with the National Strategy and have regard to Local Strategies;
- Must be consulted on Local Strategies, if affected by the strategy, by the LLFA;
- Has a duty to be subject to scrutiny from the LLFA;
- Has a duty to cooperate and share information with other RMAs.

4.8.3 LLFA as a RMA

- Must develop, maintain, apply and monitor a strategy for local flood risk management. This must be consulted on with all RMAs, the public and all other partners with an interest in local flood risk, and must comply with the National Strategy;
- Is required to coordinate and share information on local flood risk management between relevant authorities and partners;
- Is empowered to request information from others when it is needed in relation to its flood risk management functions;
- Must investigate significant flooding incidents in its area where it considers it necessary or appropriate;
- Has a duty to establish and maintain a record of structures within its area that it considers to have a significant impact on local flood risk;
- Is empowered to designate structures and features that affect flooding;

- Has powers to undertake works to manage flood risk from surface runoff, groundwater and ordinary watercourses;
- Must exercise its flood and coastal erosion risk management functions in a manner consistent with the National Strategy and the Local Strategy;
- Is permitted to agree the transfer of responsibilities for risk management functions (except the production of a Local Strategy) to other RMAs;
- Must aim to contribute to sustainable development;
- Should consider flooding issues that require collaboration with neighbouring LLFAs and other RMAs.

4.8.4 Northumbrian Water as a RMA

- Has a duty to act in a manner that is consistent with the National Strategy and have regard to Local Strategies;
- Must be consulted on Local Strategies, if affected by the strategy, by the relevant LLFA;
- Has a duty to be subject to scrutiny from LLFAs;
- Has a duty to cooperate and share information with other RMAs;
- Is responsible for managing the risks of flooding from water and foul or combined sewer systems providing drainage from buildings and yards.

4.8.5 Highways Authority (DBC) and Highways England as RMAs

- Have a duty to act consistently with the National Strategy and Local Strategies;
- Have responsibility for ensuring effective drainage of local roads in so far as ensuring drains and gullies are maintained;
- Must be consulted on Local Strategies, if affected by the Strategy, by the LLFA;
- Have a duty to be subject to scrutiny from LLFAs.

4.8.6 The Local Community

- Must be consulted on Local Strategies by the LLFA;
- Has a key role in ensuring local strategies are capable of being successfully delivered within the community. They should actively participate in this process and be engaged by the LLFA.

4.8.7 Riparian Owners

A riparian owner is someone who owns land or property alongside a river or other watercourses. A watercourse is any natural or artificial channel through which water flows including flow through a culvert, ditch, drain, cut, dyke, sluice or private sewer.

Riparian owners have statutory responsibilities, including:

- Maintaining watercourses;
- Allowing the flow of water to pass without obstruction;
- Controlling invasive alien species

Further guidance for riverside property owners can be found in the EA's helpful booklet 'Living on the Edge'[23].

4.8.8 Developers

Have a vital role in ensuring effective local flood risk management by avoiding development in areas at risk of flooding. Local Strategies should form a key element of local planning guidance.

23 https://www.gov.uk/government/publications/riverside-ownership-rights-and-responsibilities

5 Flood Risk Across Darlington

5.1 Flood risk datasets

This section of the SFRA provides a strategic overview of flood risk from all sources within Darlington. The information contained is the best available at the time of publication and is intended to provide each LPA with an overview of risk. Further detail is provided within the Volume II reports. Table 5-1 provides a summary of the key datasets used in this SFRA according to the source of flooding.

Table 5-1: Flood source and key datasets

Flood Source	Datasets / Studies
Fluvial / tidal	EA Flood Map for Planning (Rivers and Sea) (August 2017 version)
	EA Risk of Flooding from Rivers and Sea map
	Latest available EA Flood Risk Mapping Studies
	EA Historic Flood Map
	Tees Catchment Flood Management Plan
	Tees Valley Water Cycle Study
Pluvial (surface water runoff)	EA Risk of Flooding from Surface Water (RoFSW)
	Critical Drainage Areas (from 2010 Level 2 SFRA)
	DBC Preliminary Flood Risk Assessment 2011
Sewer	NW Historic sewer flood incident register
Groundwater	EA Areas Susceptible to Groundwater Flooding (AStGWF)
Reservoir	EA Reservoir Flood Maps (available online)
All sources	Northumbria Flood Risk Management Plan
	Northumbria River Basin Management Plan
	Darlington Local Flood Risk Management Strategy
	DBC Level 1 SFRA 2009; DBC Level 2 SFRA 2010
Flood risk management infrastructure	EA spatial flood defence data
	LLFA FRM asset register

5.2 Fluvial Flooding

Fluvial flooding is associated with the exceedance of channel capacity during higher flows. The process of flooding from watercourses depends on a number of characteristics associated with the catchment including geographical location and variation in rainfall; steepness of the channel and surrounding floodplain; and infiltration and rate of runoff associated with urban and rural catchments.

As noted in Section 2-1, Darlington borough contains the Main Rivers of the Rivers Tees and Skerne. The mechanisms of flooding along these watercourses and their tributaries can be described as fluvial in nature. The Flood Map for Planning, is used to assess fluvial risk to Darlington's potential development sites.

Judging from the EA's Flood Map for Planning (Rivers and Sea), the majority of flood risk within Darlington comes from the River Tees from Piercebridge to Low Middleton. The main rivers of Cocker Beck and West Beck flow into the River Skerne, which along with Bishopton Beck, Newbigging Beck, Goosepool Beck, Baydale Beck, Kent Beck and Carcut Beck, drains the higher ground down to the River Tees on the southern boundary of the borough.

The SFRA Maps in Appendix A present the EA's Flood Map for Planning which shows the fluvial coverage of flood zones 2 and 3 across the borough.

5.2.1 EA Flood Map for Planning (Rivers and Sea)

The EA's Flood Map for Planning is the main dataset used by planners for predicting the location and extent of fluvial and tidal flooding. This is supported by the CFMPs and FRMPs along with a number of detailed hydraulic river modelling reports which provide further detail on flooding mechanisms.

The Flood Map for Planning provides flood extents for the 1 in 100 AEP fluvial event (Flood Zone 3) and the 1 in 1000 AEP fluvial flood events (Flood Zone 2). Flood zones were originally prepared by the EA using a methodology based on the national digital terrain model (NextMap), derived river flows from the Flood Estimation Handbook (FEH) and two-dimensional flood routing. Since their initial release, the EA has regularly updated its flood zones with detailed hydraulic model outputs as part of their national flood risk mapping programme.

The Flood Map for Planning is precautionary in that it does not take account of flood defence infrastructure (which can be breached, overtopped or may not be in existence for the lifetime of the development) and, therefore, represents a worst-case scenario of flooding. The flood zones do not consider sources of flooding other than fluvial, and do not take account of climate change. As directed by the FRCC-PPG, this SFRA subdivides Flood Zone 3 into Flood Zone 3a and Flood Zone 3b (functional floodplain - see Section 5.2.2).

The EA also provides a 'Risk of Flooding from Rivers and Sea Map'. This map shows the EA's assessment of the likelihood of flooding from rivers and the sea, at any location, and is based on the presence and effect of all flood defences, predicted flood levels and ground levels. This dataset is not used in the assessment of flood risk for planning applications but is a useful source of information to show the presence and effects of flood risk management infrastructure. This dataset is further discussed in Section 5.2.3.

This SFRA uses the Flood Map for Planning version issued in August 2017 to assess fluvial risk to potential development sites, as per the NPPF and the accompanying FRCC-PPG. The Flood Map for Planning is updated at quarterly intervals by the EA, as and when new modelling data becomes available. The reader should therefore refer to the online version of the Flood Map for Planning to check whether the flood zones may have been updated since August 2017:

https://flood-map-for-planning.service.gov.uk/

5.2.2 Functional Floodplain (Flood Zone 3b)

The functional floodplain forms a very important planning tool in making space for flood waters when flooding occurs. Development should be directed away from these areas.

Table 1, Paragraph 065 of the FRCC-PPG defines Flood Zone 3b as:

"…land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency."

Paragraph 015 of the FRCC-PPG explains that

"…*the identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. However, land which would naturally flood with an annual probability of 1 in 20 (5%) or greater in any year, or is designed to flood (such as a flood attenuation scheme) in an extreme (0.1% annual probability) flood, should provide a starting point to help identify the functional floodplain.*

The area identified as functional floodplain should take into account the presence and effect of all flood risk management infrastructure including defences. Areas which would naturally flood, but which are prevented from doing so by existing defences and infrastructure or solid buildings, will not normally be identified as functional floodplain. If an area is intended to flood, e.g. an upstream flood storage area designed to protect communities further downstream, then this should be safeguarded from development and identified as functional floodplain, even though it might not flood very often."

A technical note is provided in Appendix C which explains the methodology used in creating the functional floodplain outline. The area identified as functional floodplain should take into account the effects of all flood risk management infrastructure including defences. Areas which would naturally flood, but which are prevented from doing so by existing defences and infrastructure or solid buildings, will not normally be identified as functional floodplain. If an area is intended to flood, e.g. an upstream flood storage area designed to protect communities further downstream, then this should be safeguarded from development and identified as functional floodplain, even though it might not flood very often.

The only modification to be made from the previous 2009 SFRA functional floodplain was along the River Skerne in Darlington Town Centre where the river model for this area was updated in 2013.

The EA's most up-to-date Historic Flood Map (HFM) and Flood Storage Area (FSA) datasets were assessed with regards to using them to update the functional floodplain where appropriate. There were not however any areas of HFM or FSA to include.

The functional floodplain outline was assessed and agreed upon by the LPA, the LLFA and the Environment Agency, based on their local knowledge.

Any site-specific FRAs should further assess areas of functional floodplain through detailed investigation and assessment of the actual risk and extent of any possible functional floodplain.

5.2.3 EA Risk of Flooding from Rivers and the Sea Map

This Risk of Flooding from Rivers and Sea map (RoFRS) shows the likelihood of flooding from rivers and the sea based on the presence and effect of all flood defences, predicted flood levels and ground levels and is shown on the Appendix A maps. The RoFRS map splits the likelihood of flooding into four risk categories:

- High – greater than or equal to 1 in 30 (3.3%) chance in any given year
- Medium – less than 1 in 30 (3.3%) but greater than or equal to 1 in 100 (1%) chance in any given year
- Low – less than 1 in 100 (1%) but greater than or equal to 1 in 1,000 (0.1%) chance in any given year
- Very Low – less than 1 in 1,000 (0.1%) chance in any given year

The RoFRS map is included on the SFRA Maps to act as a supplementary piece of information to assist the LPA in the decision-making process for site allocation.

This dataset is not suitable for use with any planning application nor should it be used for the sequential testing of site allocations. The EA's Flood Map for Planning should be used for all planning purposes, as per the FRCC-PPG.

5.3 Surface Water Flooding

Surface water flooding, in the context of this SFRA, includes:

- **Surface water runoff (also known as pluvial flooding); and**
- **Sewer flooding**

There are certain locations, generally within urban areas, where the probability and consequence of pluvial and sewer flooding are more prominent due to the complex hydraulic interactions that exist in the urban environment. Urban watercourse connectivity, sewer capacity, and the location and condition of highway gullies all have a major role to play in surface water flood risk.

Paragraph 013 of the FRCC-PPG states that SFRAs should address surface water flooding issues by identifying areas of surface water flooding and areas where there may be drainage issues that can cause surface water flooding. The EA's Risk of Flooding from Surface Water (RoFSW) map along with the LFRMS should assist with this and various mitigative measures, i.e. SuDS, should be identified. Sections 6.9 and 6.11 provide guidance on mitigation options and SuDS for developers.

It should be acknowledged that once an area is flooded during a large rainfall event, it is often difficult to identify the route, cause and ultimately the source of flooding without undertaking further site-specific and detailed investigations.

5.3.1 Pluvial Flooding

Pluvial flooding of land from surface water runoff is usually caused by intense rainfall that may only last a few hours. In these instances, the volume of water from rural land can exceed infiltration rates in a short amount of time, resulting in the flow of water over land. Within urban areas, this intensity can be too great for the urban drainage network resulting in excess water flowing along

roads, through properties and ponding in natural depressions. Areas at risk of pluvial flooding can, therefore, lie outside of the fluvial flood zones.

Pluvial flooding within urban areas across the country will typically be associated with events greater than the 1 in 30 AEP design standard of new sewer systems. Some older sewer and highway drainage networks will have a lower capacity than what is required to mitigate for the 1 in 30 AEP event. There is also a residual risk associated with these networks due to possible network failures, blockages or collapses.

5.3.1.1 Risk of Flooding from Surface Water

The Risk of Flooding from Surface Water (RoFSW), formally referred to as the updated Flood Map for Surface Water (uFMfSW) is the third generation national surface water flood map, produced by the EA, aimed at helping to identify areas where localised, flash flooding can cause problems even if the Main Rivers are not overflowing. The RoFSW, used in this SFRA to assess risk from surface water, has proved extremely useful in supplementing the EA Flood Map for Planning by identifying areas in Flood Zone 1, which may have critical drainage problems.

The RoFSW includes surface water flood outlines, depths, velocities and hazards for the following events:

- 1 in 30 AEP event (high risk)
- 1 in 100 AEP event (medium risk)
- 1 in 1000 AEP event (low risk)

The RoFSW is much more refined than the second generation map in that:

- More detailed hydrological modelling has been carried out using several design rainfall events rather than one for the second generation,
- A higher resolution Digital Terrain Model (DTM) has been used – 2 m, compared to 5 m for the second generation,
- Manual edits of DTM to improve flow routes at over 91,000 locations compared to 40,000 for the second generation,
- DTM edited to better represent road network as a possible flow pathway, this was not done for the second generation,
- Manning's n roughness (used to represent the resistance of a surface to flood flows in channels and floodplains) values varied using MasterMap Topography layer compared to blanket values for urban and rural land use applied in the second generation surface water flood map.

The aim of the RoFSW map is to identify areas where localised, flash flooding can cause problems even if the Main Rivers are not overflowing. The RoFSW has proved extremely useful in supplementing the Flood Map for Planning, by identifying areas in Flood Zone 1 which may have critical drainage problems.

The National Modelling and Mapping Method Statement, May 2013 details the methodology applied in producing the map. The RoFSW is displayed on the SFRA Maps.

5.3.2 Sewer Flooding

Combined sewers spread extensively across urban areas serving residential homes, business and highways, conveying waste and surface water to treatment works. Combined Sewer Overflows (CSOs), provide an EA consented overflow release from the drainage system into local watercourses or large surface water systems during times of high flows. Some areas may also be served by separate waste and surface water sewers which convey waste water to treatment works and surface water into local watercourses.

Flooding from the sewer network mainly occurs when flow entering the system, such as an urban storm water drainage system, exceeds its available discharge capacity, the system becomes blocked or it cannot discharge due to a high water level in the receiving watercourse. Pinch points and failures within the drainage network may also restrict flows. Water then begins to back up

through the sewers and surcharge through manholes, potentially flooding highways and properties. It must be noted that sewer flooding in 'dry weather' resulting from blockage, collapse or pumping station mechanical failure (for example), is the sole concern of the drainage undertaker.

Northumbrian Water (NW) is the water company responsible for the management of the majority of the drainage network across all four authorities.

5.3.3 Locally Agreed Surface Water Information

EA guidance on using surface water flood risk information recommends that DBC, as a LLFA, should:

"…review, discuss, agree and record, with the Environment Agency, Water Companies, Internal Drainage Boards and other interested parties, what surface water flood data best represents their local conditions. This will then be known as locally agreed surface water information".

Following on from the LLFA consultation on the RoFSW in 2013 before its release, the EA stated that the Flood Map for Surface Water (2010) and the Areas Susceptible to Surface Water Flooding (2008) maps do not meet the requirements of the Flood Risk Regulations and are not compatible with the 2013 RoFSW mapping. Consequently, these datasets cannot be used as 'locally agreed surface water information'.

Locally agreed surface water information either consist of:

- The RoFSW map, or
- Compatible local mapping if it exists i.e. from a SWMP, or
- A combination of both these datasets for defined locations in the LLFA area.

5.4 Groundwater flooding

Groundwater flooding is caused by the emergence of water from beneath the ground, either at point or diffuse locations. The occurrence of groundwater flooding is usually local and unlike flooding from rivers and the sea, does not generally pose a significant risk to life due to the slow rate at which the water level rises. However, groundwater flooding can cause significant damage to property, especially in urban areas, and can pose further risks to the environment and ground stability.

There are several mechanisms that increase the risk of groundwater flooding including prolonged rainfall, high in-bank river levels, artificial structures, groundwater rebound and mine water rebound. Properties with basements or cellars or properties that are located within areas deemed to be susceptible to groundwater flooding are at particular risk. Development within areas that are susceptible to groundwater flooding will generally not be suited to SuDS; however, this is dependent on detailed site investigation and risk assessment at the FRA stage.

5.4.1 Areas Susceptible to Groundwater Flooding (AStGWF)

The EA's national dataset, Areas Susceptible to Groundwater Flooding (AStGWF), is a low resolution map which uses four susceptibility categories to show the proportion of a network of 1 km grid squares where geological and hydrogeological conditions show that groundwater might emerge. It does not show the likelihood of groundwater flooding occurring and is not suitable for planning considerations at a site-specific level. It should only be used as a trigger for further investigation as to the possibility of groundwater flooding.

According to the AStGWF dataset, the northwestern area of Darlington town centre, the areas surrounding Roundhill Farm House and Kitching's Plantation have high potential for groundwater emergence to occur at the surface. This dataset however is coarse scale and according to the 2009 SFRA, there is little documented evidence of groundwater flooding in the Tees catchment. Groundwater levels in the Skerne catchment are however, continuing to rise as a result of mine water rebound. It is suspected that groundwater flooding occurs regularly in the Skerne catchment, but since the events often result in surface water flooding, they are recorded as such in the records. 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.

The AStGWF is shown on the SFRA Maps.

5.5 Canal and Reservoir Flood Risk

5.5.1 Canals

There are no canal systems within the Darlington Borough Council area.

5.5.2 Reservoirs

A reservoir can usually be described as an artificial lake where water is stored for use. Some reservoirs supply water for household and industrial use, others serve other purposes, for example, as fishing lakes or leisure facilities. Like canals, the risk of flooding associated with reservoirs is residual and is associated with failure of reservoir outfalls or breaching. This risk is reduced through regular maintenance by the operating authority. Reservoirs in the UK have an extremely good safety record with no incidents resulting in the loss of life since 1925.

The EA is the enforcement authority for the Reservoirs Act 1975 in England and Wales. All large reservoirs must be regularly inspected and supervised by reservoir panel engineers. LAs are responsible for coordinating emergency plans for reservoir flooding and ensuring communities are well prepared. The LPAs should work with other members of the County Durham and Darlington Resilience Forum to develop these plans. See Section 7.1.1 for more information on the County Durham and Darlington Resilience Forum.

Paragraph 014 of the FRCC-PPG states that, in relation to development planning and reservoir dam failure, "*the local planning authority will need to evaluate the potential damage to buildings or loss of life in the event of dam failure, compared to other risks, when considering development downstream of a reservoir. Local planning authorities will also need to evaluate in Strategic Flood Risk Assessments (and when applying the Sequential Test) how an impounding reservoir will modify existing flood risk in the event of a flood in the catchment it is located within, and/or whether emergency draw-down of the reservoir will add to the extent of flooding.*"

5.5.3 Reservoir Flood Maps

The EA has produced reservoir flood maps (RFM) for all large reservoirs that they regulated under the Reservoirs Act 1975 (reservoirs that hold over 25,000 cubic meters of water). The FWMA updated the Reservoirs Act and targeted a reduction in the capacity at which reservoirs should be regulated from 25,000m³ to 10,000m³. This reduction is, at the time of writing, yet to be confirmed meaning the requirements of the Reservoirs Act 1975 should still be adhered to.

The maps show the largest area that might be flooded if a reservoir were to fail and release the water it holds, including information about the depth and speed of the flood waters. In September 2016, the EA produced a RFM guide ' Explanatory Note on Reservoir Flood Maps for Local Resilience Forums – Version 5[24]' which provides information on how the maps were produced and what they contain.

The RFM can be viewed nationally at:

https://flood-warning-information.service.gov.uk/long-term-flood-risk/map?map=SurfaceWater#Reservoirs_3-ROFR

5.6 Historic Flooding

Darlington has experienced several significant flood events since flood records began on the River Tees, which is to be expected from a large river which will seasonally overtop its banks and fill the floodplain. However, the first recorded date of flooding on the River Skerne was recorded much later in 1852[25].

24 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/558441/LIT_6882.pdf

25 River Tees Draft CFMP 2008.

5.6.1 River Tees

Within Darlington, the River Tees meanders predominantly through rural land. The Tees has a wide floodplain and flood flows from the Upper Tees and River Skerne are attenuated by significant overbank flood storage. Much of the land alongside the River Tees is defended with the aim to protect the surrounding agricultural land, with almost 20 kilometres of raised defences and 34 kilometres of maintained channel. However, privately owned assets may be less reliable than EA owned defences, as they are not maintained or regulated like those flood defences owned by the EA. There are sections of the Tees that aim to provide a higher level of protection in order to defend settlements such as Neasham and Hurworth. However, historically there has been significant flood events in these existing settlements along the River Tees. The history of flooding within Darlington can be traced back to 1753 when Neasham was flooded from the River Tees. Table 5-2 details historic flooding data from the Tees in these locations, and also includes historic flooding from other watercourses in the borough.

Table 5-2 Historic Fluvial Flooding Data in Darlington[26]

Location	Watercourse	Date of flood event
Neasham	River Tees	1753, 1771 (15 ft deep floods), 1852, 1886, 1890, 1892, 1923 (2 ft), 1924, 1927, 1928, 1963, 1967, 1968, 1991, 1995.
Hurworth Place	River Tees	1967, 1968 1995, 2000
Town Centre Fringe	River Skerne	1967, 1979
Faverdale & Morton Park	River Tees	2000
Cockerton	West Beck	1982
Pierremont	Cocker Beck	This area has seen a number of properties flooded from sewer and surface water flooding, but NW 2009 & 2010 works (£2 million scheme helps to alleviate the risk of flooding) helped to alleviate
Heighington	Surface Water	2000
Town Centre & Longfield Road, North Road, Brian Road	Surface Water	2007
River Skerne		1771, 1852, 1856, 1875 (twice), 1876, 1878, 1880, 1886, 1892, 1895, 1900, 1903, 1924, 1928, 1948, 1967 (twice), 1979, 2000, 2001

According to DBC's LFRMS[27], more recent flood events have occurred in Darlington, not previously mentioned in the previous 2009 SFRA and 2011 PFRA. These events were attributed to localised surface water flooding in 2002, 2003, 2007, 2011, 2012 and 2013.

5.6.2 Kent Beck

Kent Beck enters the River Tees just upstream of Neasham. The Neasham flood defence scheme prevented the majority of flooding impacts caused from the River Tees in January 1995 and from Kent Beck in June 2000, however, the scheme failed to protect a number of properties in Neasham from flooding during these events. The flooding emerged from Kent Beck and affected 55 properties during the 1995 event however, since then, the defence at Willow Garth in Neasham has been raised to protect the settlement from the risk of flooding in the future. The 2000 event was a result of flood defence failure, caused by seepage through holes in the left flood defence bank flooding 13 properties. In 2011, a new major flood defence was built to reduce the flood risk from this beck.

26 DBC Level 1 SFRA 2009 and 2011 PFRA

27 Darlington Borough Council Local Flood Risk Management Strategy. 2016

5.6.3 River Skerne

The River Skerne catchment is divided into two distinct reaches and is characterised by wide, flat flood plains and gentle slopes. The upper reach comprises of rural, mostly agricultural land and the lower reach is predominantly the urban town of Darlington.

The main area of risk on the Skerne is Darlington, as a result of the backing up of drains or from surface water being unable to enter into the river during high flows. To reduce the risk of flooding, engineering works such as river restoration and straightening and deepening of the Skerne have been performed, according to the River Tees CFMP[28], however the surrounding areas are still at risk.

According to the previous SFRA, the first recorded widespread flood event which caused significant damage to properties in Darlington town centre was in 1771 which was attributed to the Skerne. As illustrated in Table 5-2, in 1875, two flood events occurred due to heavy rainfall, impacting the gasworks at the upstream end of Darlington through to South Park. In 1876 work to improve the Skerne channel capacity downstream and since then, flooding during the twentieth century has been less frequent.

Similarly, flooding on the Skerne was greatly reduced as a result from the 1966 Flood Alleviation Scheme (FAS) however, other flood events have still occurred. 54 properties along Valley Street, John Street, Oxford Street, Mount Street and Parkgate were all flooded as a result of the temporary sewer within the river channel which obstructed the river flow, in November 1967. Further investment works were prompted due to this event, between 1970 and 1972. The Russel Street weir was lowered for the second time and the channel between Chestnut Street and John street was widened from 25 feet to 35 feet.

Heavy snowfall on 17th March 1979 began to melt and swell the river before 40-50 mm of rain fell on the saturated catchment 11 days later, on the 28th March 1979. Priestgate Bridge overtopped causing the river to flow out of the bank onto the Ring Road within the centre of Darlington, however no properties were flooded. It appeared that the engineering works carried out in the area had succeeded in preventing widespread flooding damage to domestic and commercial properties in Darlington.

There were also flood events in 1875, 1903, 1976, 1979, 1982. The most recent flood events, according to the previous SFRA, were in November 2000 and February 2001, flooding a number of properties in Darlington. During a flood event with a 1% chance of occurring in any given year, over 2,350 people, 3% of residential properties and 8% of commercial properties are at risk.

5.6.4 West Beck and Cocker Beck

West Beck, a tributary of Cocker Beck, which in turn flows into the River Skerne (a tributary of the River Tees) originates in the north of Darlington and converges with Cocker Beck in Cockerton upstream of B679. Historically, there has been a number of flood problems along West Beck and Cocker Beck dating back to 1975, including October 1976, March 1979 and June 1982 which involved the surcharging of Newton Lane culvert flooding a small number of residential properties. The fields surrounding the Cocker Beck and West Beck confluence were flooded, recorded in October 1976. Cocker Beck was identified as a problem watercourse by DBC and the EA due to flooding at Newton Lane, with the main cause attributed to lack of capacity in the culvert and channel downstream, due to inadequate size and siltation[29].

In recent years, there has been significant development of FRM infrastructure around the Cocker Beck catchment, including flood banks and culverts installed around Darlington, as well as Flood Warning Areas along the Skerne.

5.6.5 Historic Surface Water Flooding

NW provided, within 100 m^2 areas, their historic sewer flooding incident register to aid with the understanding of current flood risk flooding. The historic incident register is used to record flood

28 https://ih-igcse-geography.wikispaces.com/file/view/Tees+CFMP+summary.pdf

29 Darlington 2009 Level 1 Volume II SFRA

risk attributable to water company controlled sewer networks, whether that be from foul and / or surface water sewers. The historic incidents are shown on the SFRA Maps.

According to the DBC PFRA 2011, Darlington has a number of known areas that have historically suffered surface water flooding which include:

- *Middleton St George*
- *Airport Area*
- *Coatham Mundeville*
- *Eastbourne*
- *Lingfield*
- *Pierremont*
- *Town Centre Fringe*

DBC's LFRMS also identified the area of Blackwell to have significant surface water flooding problems, after high river levels and the failure of surface water discharging into watercourses caused surface water flooding in this location in August 2011.

NW provided information of the 2009, £2 Million Scheme in Pierremont to reduce flood risk to 14 homes on Pierremont Crescent, as part of the Level 2 SFRA. A further 12 homes on Cleveland Avenue, Dale Road, Millbank Road, Stonedale Crescent and Woodland Terrace was also included in a second phase of the scheme in 2010.

They also provided information on historical flooding incidents within the Town Centre/ Town Centre Fringe which were caused by the sewer system in the area being old and prone to problems such as culvert collapse.

Surface water flooding problems were also noted within the Bedford Street Area around the Fire Station and Park Place, and a £2.2 million project upgraded the sewerage network in the area. 150 metres of new sewer pipe was installed at South Park and Polam Lane, with 420 metres of sewer pipe upsized at Bedford Street. An underground storm water storage tank will also be installed in South Park to hold 1.75 million litres of water in times of heavy rainfall, to be returned to the sewerage network after the storm.

There was significant surface water flooding at Blackwell, Darlington in August 2011 as a result of heavy rainfall, causing river levels to exceed and therefore the failure of surface water or combined sewers to discharge into watercourses.

5.6.6 EA Historic Flood Map

The Historic Flood Map (HFM) is a spatial dataset showing the maximum extent of all recorded historic flood outlines from river, sea and groundwater, and shows areas of land that have previously been flooded across England. Records began in 1946 when predecessor bodies to the EA started collecting information about flooding incidents. The HFM accounts for the presence of defences, structures, and other infrastructure where such existed at the time of flooding. It includes flood extents that may have been affected by overtopping, breaches or blockages. It is also possible that historic flood extents may have changed and that some areas would not flood at present i.e. if a flood defence has been built.

The HFM does not contain any information regarding flood source, return period or date of flooding, nor does the absence of the HFM in an area mean that the area has never flooded, only that records of historic flooding do not exist.

The HFM shows some small areas of flooding from the upstream of the River Skerne flooding some industrial and residential areas; flooding of agricultural land further upstream of the Carcut Beck around Sadberge and Dales House Farm; significant flooding north of Croft on Tees at the confluence of the Rivers Skerne and Tees and fluvial flooding across the southern boundary of Darlington near Glebe Farm, Low Coniscliffe, Baydale Farm, Blackwell, Stapleton, Dalton Wood, Low Rockliffe, Neasham, East Sockburn Farm to Crosby Wood, Fish Locks Wood, Low Dinsdale and near Low Middleton House.

The HFM is shown on the SFRA maps in Appendix A.

5.7 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. 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.

5.7.1 EA Assets (Spatial Flood Defences)

The EA maintain a spatial dataset called the Spatial Flood Defences dataset. This national dataset contains such information as:

- Asset type (flood wall, embankment, high ground, demountable defence, beach, dunes);
- Flood source (fluvial, tidal, fluvial and tidal);
- Design standard (SoP);
- Asset length;
- Asset age;
- Asset location; and
- Asset condition. See Table 5-3 for condition assessment grades using the EA's Condition Assessment Manual[30] (CAM).

Table 5-3 EA flood defence condition assessment grades

Grade	Rating	Description
1	Very Good	Cosmetic defects that will have no impact on performance
2	Good	Minor defects that will not reduce the overall performance of the asset
3	Fair	Defects that could reduce the performance of the asset
4	Poor	Defects that would significantly reduce the performance of the asset. Further investigation needed.
5	Very Poor	Severe defects resulting in complete performance failure.

30 Environment Agency. (2012). Visual Inspection Condition Grades. In: EA Condition Assessment Manual. Bristol: Environment Agency. p9.

Table 5-4 Major flood defences in the Darlington

Defence Location	Asset Features	Asset Type	Flood source	Water-course	Design standard	Condition
North - South of Darlington along the River Skerne	32	28 Flood Walls 4 Embankments	31 Fluvial 1 Tidal	River Skerne	0 (23) 5 (3) 10 (2) 200 (4)	2 (10) 3 (18) 4 (4)
Southern Boundary of Darlington along the River Tees	20	17 Embankments 3 Flood Walls	Fluvial	River Tees	5 (6) 10 (8) 25 (1) 100 (5)	Unknown (1) 2 (4) 3 (7) 4 (4) 5 (4)
Baydale Beck	3	3 Embankments	Fluvial	Baydale Beck	5 (1) 50 (2)	3 (2) 5 (1)

In total, there are 67 flood defence assets within Darlington, according the EA's spatial flood defence defence dataset.

Table 5-4 Major flood defences in the Darlington**Error! Reference source not found.**highlights the main locations within Darlington that have significant FRM assets, the majority of which are located along the southern boundary of the borough, defending the River Tees.

The town centre of Darlington is prone to flooding due to the natural topography of the catchment and the fact that the River Skerne runs through the urban centre of the town. The catchment has extensive areas of very flat land adjacent to the main channel and tributaries.

There are 32 constructed flood defence assets that run along the River Skerne through Darlington, 28 of which are floodwalls and 4 are flood embankments. The floodwalls aim to prevent the Skerne from flooding areas in the centre of the town from Albert Road, near Hope Town, to the West of Bank Top, with the flood wall extending only on the left bank of the river along Victoria Embankment. These flood walls, constructed through the town centre of Darlington appear to be designed to prevent flood water flooding commercial and residential properties in the area.

The defences along the River Skerne have a design standard range of 5 to 200 years and a condition range of 2 to 4 (Good/Poor), however the majority of the flood defences have a design standard of 0. A number of assets have a design standard of zero. It is assumed that the design standard of these assets is unknown. The most common condition associated with the Skerne defences is 3, which is considered 'Fair' according to the EA's Condition Assessment Manual (CAM) (as discussed in Table 5-3 with defences 'having defects that could reduce the performance of the asset'.

Fluvial flood defences exist along the River Tees, with a design standard range of 5 to 100 and condition grades of between 2 and 5 (Good/Very Poor), protecting the settlements that could be affected by fluvial flooding from the Tees. Fluvial flood embankments protect the majority of the areas around the River Tees, however 4 of these embankment assets have a 'Poor' condition grade. The 'poor' condition of the defence means that there are defects that would significantly reduce the performance of the asset meaning further investigation is required by to ensure the asset can operate at its full capacity and consequently protect the surrounding areas from flooding.

There are fluvial flood walls constructed near the confluence of the Tees and Kent Beck and Neasham Stell, near the village of Neasham, which has a long history of flooding, as discussed in Section 5.6.1. These fluvial defences have a condition range of 2-4 (Good/Poor) and design standard of 100 and therefore can be described as providing a 1 in 100-year standard of protection. There is also a tidal floodwall located on the Kent Beck, which looks to be designed to protect to main Hurworth Road from flooding.

5.7.2 LLFA Assets

The LLFA (DBC) own and maintain a number of assets throughout the borough which includes 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. 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.

DBC's asset register is available to view via:

http://public.gismapp.com/darlington

5.7.3 Water Company Assets

The sewerage infrastructure within the borough of Darlington is likely to be based on Victorian sewers from which there is a risk of localised flooding associated with the existing drainage capacity and sewer system. The drainage system may be under capacity and / or subject to

blockages resulting in localised flooding of roads and / or property. NW is responsible for the management of the adopted sewerage system. This includes surface water and foul sewerage. There may however be some private surface water sewers in the borough as only those connected to the public sewer network that were transferred to the water companies under the Private Sewer Transfer in 2011 are likely to have been constructed since this transfer date. Surface water sewers discharging to watercourses were not part of this transfer and would therefore not be under the ownership of NW, unless adopted under a Section 104 adoption agreement.

Water company assets include Wastewater Treatment Works, Combined Sewer Overflows, pumping stations, detention tanks, sewer networks and manholes.

5.7.4 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.
- 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 flood risk management work programmes applicable to Darlington. Follow the link below for the latest news:

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

Proposed works in the borough, at the time of writing, associated with the FCERM Development Programme include:

- Darlington Town Centre Fringe Flood Alleviation Scheme (2019-2021+)
- Hurworth Asset Recovery (formerly Hurworth Place) (2019-2021)
- Oxney Flats Flood Alleviation Scheme (2019-2021)
- Cockerton Flood Alleviation Study (2021+)

5.7.5 Natural Flood Management

Natural flood management (NFM) is a type of flood risk management used to protect, restore and re-naturalise the function of catchments and rivers. NFM has the potential to provide environmentally sensitive approaches to minimising flood risk, to reduce flood risk in areas where hard flood defences are not feasible and to increase the lifespan of existing flood defences.

NFM represents a range of techniques that aim to reduce flooding by working with natural features and processes in order to store or slow down flood waters before they can damage flood risk receptors (e.g. people, property, infrastructure, etc.). Working with Natural Processes (WwNP) involves taking action to manage flood and coastal erosion risk by protecting, restoring and emulating the natural regulating functions of catchments, rivers, floodplains and coasts. Both the European Commission and UK Government are actively encouraging the implementation of NFM measures within catchments and coastal areas in order to assist in the delivery of the requirements of various EC Directives relating to broader environmental protection and national policies. It is fully expected that the sustained interest in NFM implementation across the UK will continue in the post-Brexit era as a fundamental component of the flood risk management tool kit.

The Northumberland Rivers Catchment partnership have developed proposals for a project to tackle issues on 'urban streams' in south east Northumberland, which could involve NFM strategies upstream and could benefit the borough of Darlington.

5.7.6 Working with Natural Processes (WwNP)

JBA Consulting has been working with the EA and Lancaster Environment Centre (LEC) to update maps of Potential for Working with Natural Processes. LEC has developed a new spatial model of slowly permeable soils to identify areas where shrub or tree-planting could increase hydrological losses and slow the flow based on British Geological Survey (BGS) 1:50k maps, who have also agreed to an open government license for the maps. The new national maps for England make use of different mapping datasets and highlight potential areas for tree-planting (for three different types of planting), runoff attenuation storage, gully blocking, and floodplain reconnection. The maps can be used to signpost areas of potential, and do not take into account issues such as land-ownership and drainage infrastructure, but they may well help start the conversation and give indicative estimates of, for example, additional distributed storage in upstream catchments.

Interactive mapping showing the potential for WwNP is available for all river basin districts, including Northumbria, via:

http://wwnp.jbahosting.com/

According to the spatial model of slowly permeable soils there are areas within Darlington where by removing existing defences and reconnecting the floodplain could create areas for potential without causing risk to properties. These areas are predominately located along all watercourses within the borough, with the largest area located at the confluence on the River Tees and Ulnaby Beck. There are also larger areas with potential for floodplain reconnection along the River Skerne, north of the urban centre from Great Burden to Brafferton, and the areas around Bishopton Lane. Reconnecting the river with its floodplain and naturalising the river itself should lead to reduced peak flood levels which will protect properties and infrastructure in settlements downstream.

NFM measures are designed to reduce the flow of floodwater to minimise the risk of flooding to areas downstream. Tree planting can play a vital role in reducing flood risk within an area. Increased rainfall interception and infiltration may reduce surface water runoff and therefore increase the potential of NFM in the area. There are vast expanses across the more rural areas of Darlington that would benefit from tree planting, however the town centre and southern boundary of the borough are excluded from this potential.

DBC should look to become actively engaged with the catchment partnerships and the Rivers Trust's NFM investigations with a view to setting aside land for NFM.

6 Development and Flood Risk

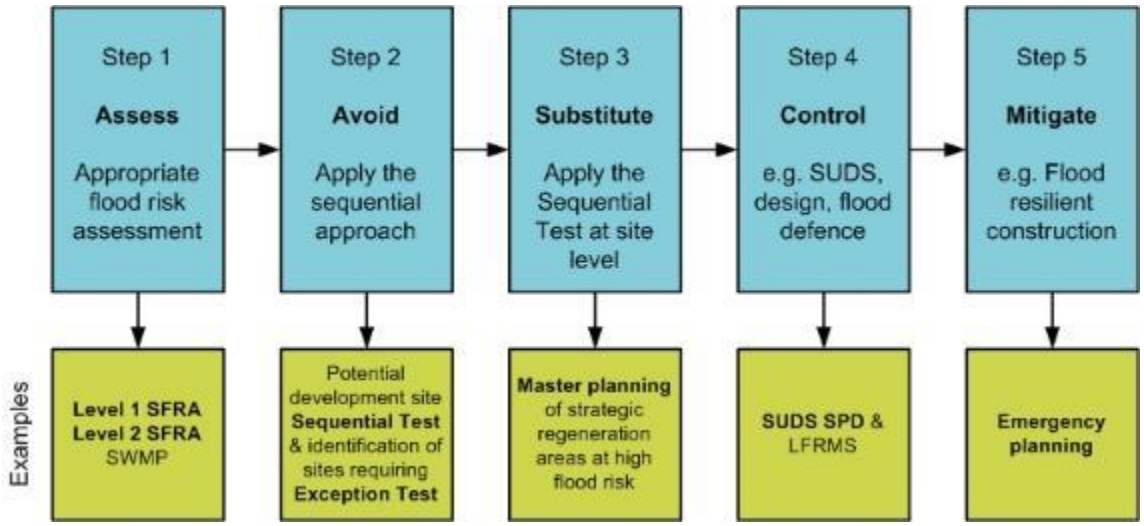
6.1 The Sequential Approach

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 6-1 illustrates the FRM hierarchy with an example of how these may translate into each authorities' management decisions and actions.

Figure 6-1: 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.

6.2 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:

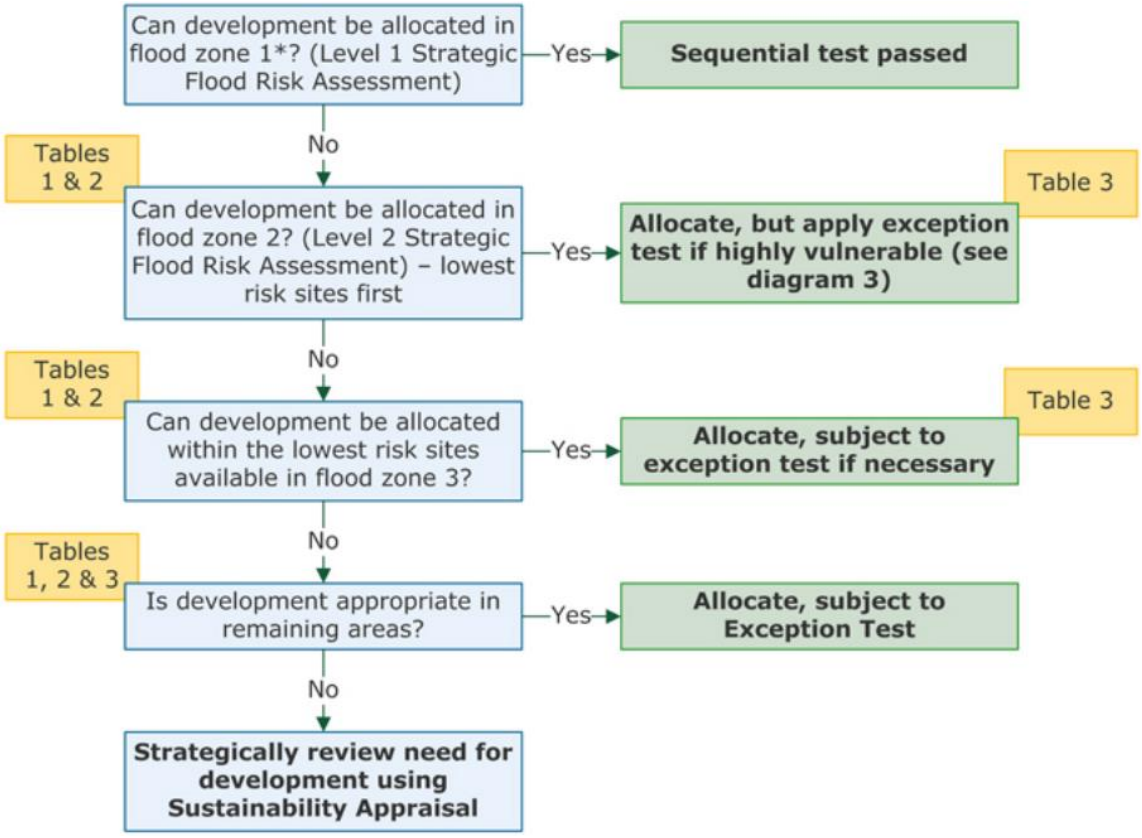
1. Applying the Sequential Test and if the Sequential Test is passed, applying and passing the Exception Test, if required;
2. Safeguarding land from development that is required for current and future flood management;
3. Using opportunities offered by new development to reduce the causes and impacts 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 6-2 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 spreadsheets in Appendix B. This spreadsheet will help show that the LPA has applied the Sequential Test, through this SFRA, and thus considered development viability options for each potential development site.

Figure 6-2: Local Plan sequential approach to site allocation[31]



(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 6-2 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.

The NPPF para 160 states:

"The application of the exception test should be informed by a strategic or site-specific flood risk assessment, depending on whether it is being applied during plan production or at the application stage. For the exception test to be passed it should be demonstrated that:

a. *the development would provide wider sustainability benefits to the community that outweigh the flood risk; and*
b. *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 exception test should be satisfied for development to be allocated or permitted." (para 161).

31 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 Sustainable Drainage Systems 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.

6.3 Local Plan Sites Assessment

The LPA Policy Team provided a GIS layer of possible development sites with potential to be included as site allocations in the new Local Plan. These sites have been put forward by developers / land owners for consideration in the Local Plan process, have been considered in the past or have been allocations in the previous development plan. 86 potential sites have been provided, including the following proposed uses:

- Residential (51 sites)
- Employment (29 sites)
- Mixed use (6 sites) includes housing and employment

In order to inform the Sequential Approach to the allocation of development through the Local Plan (see Figure 6-2), this review entails a high-level GIS screening exercise overlaying the potential development site allocations 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) has been delineated as part of this Level 1 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 in Appendix B.

It is important to consider that each individual site will require further investigation, following this review, as local circumstances may dictate the outcome of the recommendation. Such local circumstances are discussed in the following section, Section 6.4.

6.4 Screening of potential sites

This section of the report draws together the results included in the Development Site 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 flood zone and each surface water flood zone. Fluvial 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 6-1 shows the number of sites within each fluvial flood zone and Table 6-2 **Error! Reference source not found.**shows the number of sites within each surface water flood zone.

Table 6-1: Number of potential development sites at risk from Flood Map for Planning flood zones

Site type	Number of sites within…			
	Flood Zone 1*	Flood Zone 2	Flood Zone 3a	Flood Zone 3b
Residential	40	11	9	8
Employment	25	4	4	2
Mixed use	4	2	2	1
TOTAL	**69**	**17**	**15**	**11**
*Sites with 100% area within Flood Zone 1				

Table 6-2: Number of allocated sites within surface water flood zones

Site type	RoFSW flood zone		
	High risk (1 in 30)	Medium risk (1 in 100)	Low risk (1 in 1000)
Residential	29	32	39
Employment	26	28	29
Mixed use	6	6	6
Total	**61**	**65**	**74**

The spreadsheet also includes high level broad-brush strategic recommendations on the viability of development for each site. Development viability is assessed, based on the flood risk vulnerability classification in Table 2: 'Flood risk vulnerability classification' of the FRCC-PPG (Paragraph 066). The strategic recommendations are intended to assist the LPA in carrying out the Sequential Test. Table 6-3 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 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 6-3: Number of sites per strategic recommendation

Site/proposed use	Strategic Recommendation				
	A	B	C	D	E
Residential	4	0	30	8	9
Employment	1	0	1	27	0
Mixed use	0	1	3	2	0
Total	**5**	**1**	**34**	**37**	**9**

It is important to note that each individual site will require further investigation, as local circumstances may dictate the outcome of the strategic recommendation. 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.
- 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.
- 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.
- 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.

6.4.1 Flood Map for Planning site assessment

The following strategic recommendations provide only a guide, based on the fluvial 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 DBC'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.

6.4.1.1 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. Land allocated for housing falls in to the more vulnerable category and sites for employment are in the less vulnerable category. Development should not be permitted for sites within the highly, more or less vulnerable categories that fall within Flood Zone 3b. If the developer is able to avoid 3b however, then part of the site could still be delivered.
- There is a significant risk from surface water flooding i.e. 10% or greater of a site area is within the high or medium risk surface water flood outlines and the total area of the site may not be large enough to accommodate such surface water flooding on-site. Also, consideration should be given to the development vulnerability.

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.

The 10% threshold is purely there to aid the LPA's sieving process for high risk sites.

Strategic Recommendation A applies to five sites overall. Four have more than 10% of their area within the functional floodplain (Table 6-4) and one site is recommended for withdrawal due to significant surface water risk (Table 6-5).

Further investigation may reveal that three of the four sites listed in Table 6-4 may still be deliverable given that they cover large areas and therefore may be able to accommodate the functional floodplain on site by leaving these areas as open space or by creating amenity greenspace. The LPA should refer to the SFRA maps in Appendix A to check whether this may be possible before deciding whether to take these sites forward or to withdraw them. Site 263 is unlikely to be developable due to the small size of the site and the fact that nearly a quarter of the site is with Flood Zone 3b.

Table 6-4: Sites to consider withdrawing that are within Flood Zone 3b

Site ID	Site Name	Proposed use	Site Area (ha)	% Area within FZ3b
020	Great Burdon	Residential	88.39	16.71
100	Hall Farm, Branksome	Residential	21.90	13.71
263	53 Blackwell	Residential	0.39	21.65
293	North of Great Burdon	Residential	27.96	12.13

The employment site at significant surface water risk, in Table 6-5, site 360, should be assessed further by the LPA as to whether the 10.7% of the site at high risk could be left open to accommodate the surface water on site.

Table 6-5: Sites to consider withdrawing due to significant surface water risk

Site ID	Site Name	Proposed use	Site Area (ha)	% Area at high risk	% Area at medium risk	% Area at low risk
360	Heighington Lane North	Employment	5.67	10.72	5.04	11.54

6.4.1.2 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 and mixed use) that is within Flood Zone 3a. Less vulnerable (employment) uses of land do not require the Exception Test.

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 would be very 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 the FZ3b.

Strategic Recommendation B applies to one potential development site, mixed use site 371 shown in Table 6-6. Strategic Recommendation B applies due to the 21.23 % of the site footprint being within Flood Zone 3a. Development could be potentially be allocated if located outside Flood Zone 3 and in the remaining 50% of the site, subject to the site passing the exception test is passed and an FRA.

Table 6-6: Site where Exception Test would be required

Site ID	Site Name	Proposed use	Site Area (ha)	% Area within FZ3a
371	Town Centre Fringe	Residential	71.02	21.23

6.4.1.3 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 risk, it may be possible that a review of site layout and / or design around the flood risk at the development planning stage may enable development to proceed. A Level 2 SFRA or 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 residential or mixed use (more vulnerable) site is within Flood Zone 3a.

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 when less than 10% of the site area is at risk. This 10% threshold does not account for local circumstances.

Overall there are 34 potential sites to which Strategic Recommendation C applies. Five of these sites are very large strategic developments (over 50 ha), three for residential and two mixed use. Four of these large sites are over 95% within Flood Zone 1 with the fourth 89% within Flood Zone 1 and none of them are at significant risk from surface water. There should therefore be no issue with tailoring site layout around the flood risk.

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 zone 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.

Any site layout and design should take account of the 8 metre easement buffer from the top of bank or the landward toe of a defence on main rivers, where development is not permitted. 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 suitable SuDS.

6.4.1.4 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 which would be subject to, and have to pass, the Exception Test.
- Employment sites within Flood Zone 3a assuming the site use falls within the less vulnerable or water-compatible category of the flood risk vulnerability classification of the FRCC-PPG. 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.
- Any site 100% within Flood Zone 1 that is greater than or equal to 1 hectare in area.

Recommendation D applies to 37 potential sites overall. 35 of these sites are 100% within Flood Zone 1 with 32 at some level of surface water risk. The other three are not at any risk from surface water, according to the RoFSW, though are greater than 1 ha in area and therefore must be subject to a FRA.

A precautionary approach to accounting for climate change should be considered for sites falling under this recommendation.

All development proposals within Flood Zone 2 or Flood Zone 3a must be accompanied by a site-specific FRA. Any site 100% within Flood Zone 1, that is not within any surface water flood zones,

that is equal to or greater than 1 hectare in area must also be accompanied by a FRA to determine vulnerability to flooding from other sources as well as fluvial and surface water. 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.

Paragraph 050 of 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."

6.4.1.5 Strategic Recommendation E – development could be allocated 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 should be allocated on flood risk grounds, based on the evidence provided within this SFRA. Further investigation may be required by the developer and an FRA is required to assess further or new information that may not have been included within this SFRA. Recommendation E applies to 9 sites.

Using the precautionary approach to climate change, the SFRA Maps in Appendix A should be consulted to ascertain which sites are in close proximity to Flood Zones 2 and 3a and may therefore be at risk from either flood zone in 100 years' time. Assuming there is a risk, then the developer should carry out a FRA to confirm future safety of the development.

Strategic Recommendation E applies to any site with its area 100% within Flood Zone 1 and not within any surface water flood zone.

6.4.2 Surface water risk to potential sites

This section assesses surface water risk to each site according to the Risk of Flooding from Surface Water (RoFSW) dataset. As with the fluvial flood zones, the Development Site Assessment spreadsheet isolates each of the surface water flood outlines so that any area of a site within the high risk 1 in 30 AEP outline is excluded from the medium risk 1 in 100 AEP outline and any area within the 1 in 100 AEP outline is excluded from the low risk 1 in 1000 AEP outline. This allows a sequential assessment of risk at each site.

NOTE: This assessment of surface water risk to sites DOES NOT take account of local circumstances, only that part of a site area falls within a surface water flood outline of the EA's Risk of Flooding from Surface Water dataset.

Table 6-7 shows the number of sites at risk for each event. A number of these sites may also be at fluvial flood risk. For this SFRA, significant surface water flood risk to a site includes any site with 10% or more of its area within the high or medium risk surface water flood outlines or 20% or more within the low risk outline.

As explained with the fluvial flood zones, the percentage thresholds are not included within any policy, it is merely considered that where a site has 10% or greater of its area at risk from the high or medium risk outlines, or 20% or greater for the low risk outline, then it could prove difficult to manage this surface water on-site. Therefore, a site-specific FRA or drainage strategy should be carried out to investigate possible mitigation measures for flood storage or infiltration techniques through appropriate SuDS.

Table 6-7 Number of sites at risk from surface water flooding

RoFSW event outline	Number of sites at risk	Number of sites at significant risk
1 in 30 AEP	61	1
1 in 100 AEP	66	1
1 in 1000 AEP	74	1
In reality, sites within the 1 in 30 AEP outline will also be in the 1 in 100 AEP outline and those within the 1 in 100 AEP outline will also be in the 1000 AEP outline.		

Of the 61 sites at risk from the higher risk 1 in 30 AEP event, site 360 has 10% or more of its site area at risk. This site is therefore considered to be at significant risk from surface water and are recommended for withdrawal, as discussed in Section 6.4.1.1.

Table 6-8 Sites at significant surface water risk

Site ID	Proposed use	Site Area (ha)	% Area within 1 in 30 AEP Outline (RoFSW)	% Area within 1 in 100 AEP Outline (RoFSW)	% Area within 1 in 1000 AEP Outline (RoFSW)
360	Employment	5.67	10.72	5.04	11.54

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

- Possible withdrawal, redesign or relocation of the site for those sites at significant risk. This applies to the site 360 listed in Table 6-8;
- A detailed site-specific FRA incorporating surface water flood risk management;
- 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 6.11 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 delineation of Critical Drainage Areas may be appropriate for areas particularly prone to surface water flooding. Detailed analysis and consultation with the LLFA, NW, 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 targeted locations with any such areas with critical drainage problems. Investigation into the capacity of existing sewer systems would be required in order to identify critical parts of the system. Drainage model outputs could 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.

6.5 Summary of Sequential Testing Outcomes

There are several outcomes which could come out of the Sequential Testing process. Each outcome is discussed below. The LPA should refer to Section 6.3 of this report, and Appendix B, for details on the sites assessments carried out for this SFRA.

6.5.1 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 more (residential, mixed use inclusive of residential) or less vulnerable (employment) 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 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.

6.5.2 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.

6.5.3 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 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 options should take account of the 8 metre easement buffer along watercourses, from the top of the bank or the landward toe of a defence on main rivers, where development is not permitted. 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 6.11).

6.5.4 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 50, a site-specific FRA is required for proposals:

- 1 hectare or greater in Flood Zone 1
- Situated in Flood Zone 2 and 3; for all proposals for new development (including minor development and change of use)
- 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[32] and also the EA guidance for FRAs for planning applications[33]. CIRIA's report 'C624 Development and Flood Risk[34]' and the Tees Valley Authorities Local Standards for Sustainable Drainage also provides useful guidance for developers and the construction industry. Section 6.9 of this report provides further guidance on FRAs for developers.

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

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

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

6.5.5 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).

6.6 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, as shown in Figure 6-2.

By avoiding sites identified in this SFRA as being at significant risk, such as those listed in Section 6.4.1.1, or by considering how changes in site layout can avoid those parts of a site at flood risk, such as any site included within Recommendation C (Section 6.4.1.3), the Council 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 should be tailored to ensure sustainable development. This should involve investigation into appropriate SuDS techniques (see Section 6.11).

Surface water flood risk should be considered with the same importance as fluvial flood risk.

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 3, 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 Sections 5.7.5 and 5.7.6 for information on Natural Flood Management and Working with Natural Processes).

6.7 Safeguarded 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.

A strategic assessment has been made of the potential development sites and their applicability for flood storage. 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.

6.8 Cumulative impacts

The NPPF (2018) states that strategic policies…

"…should consider cumulative impacts in, or affecting, local areas susceptible to flooding, and take account of advice from the Environment Agency and other relevant flood risk management authorities, such as lead local flood authorities and internal drainage boards". (para 156)

Previous policies have relied on the assumption that if each individual development does not increase the risk of flooding, the cumulative impact will also be minimal. However, if there is a lot of development occurring within one catchment, particularly where there is flood risk to existing properties or where there are few opportunities for mitigation, the cumulative impact may be to change the flood response of the catchment.

This SFRA considers cumulative impacts of new development through much of the generic advice provided on mitigation throughout Section 6 of this report. Consideration is given to the following:

- Cross boundary impacts i.e. there should be dialogue between DBC and neighbouring authorities upstream and downstream of Darlington. Decisions on flood risk management practices and development in these authorities should involve discussion with DBC given the possible downstream impacts of development on flood risk;
- Leaving space for floodwater, utilising greenspace for flood storage and slowing the flow, and
- SuDS and containment of surface water on-site as opposed to directing elsewhere (see Section 6.11).

6.9 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 (2018) 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 6-3)***
    - *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 6.5.4 of this SFRA;*
    - *Also, refer to the EA Standing Advice, the Tees Valley Authorities Local Standards for Sustainable Drainage, CIRIA Report C624, the NPPF and the FRCC-PPG;*
    - *Consult the LLFA.*
- ***Submit FRA to the LPA and the EA for approval, where necessary***

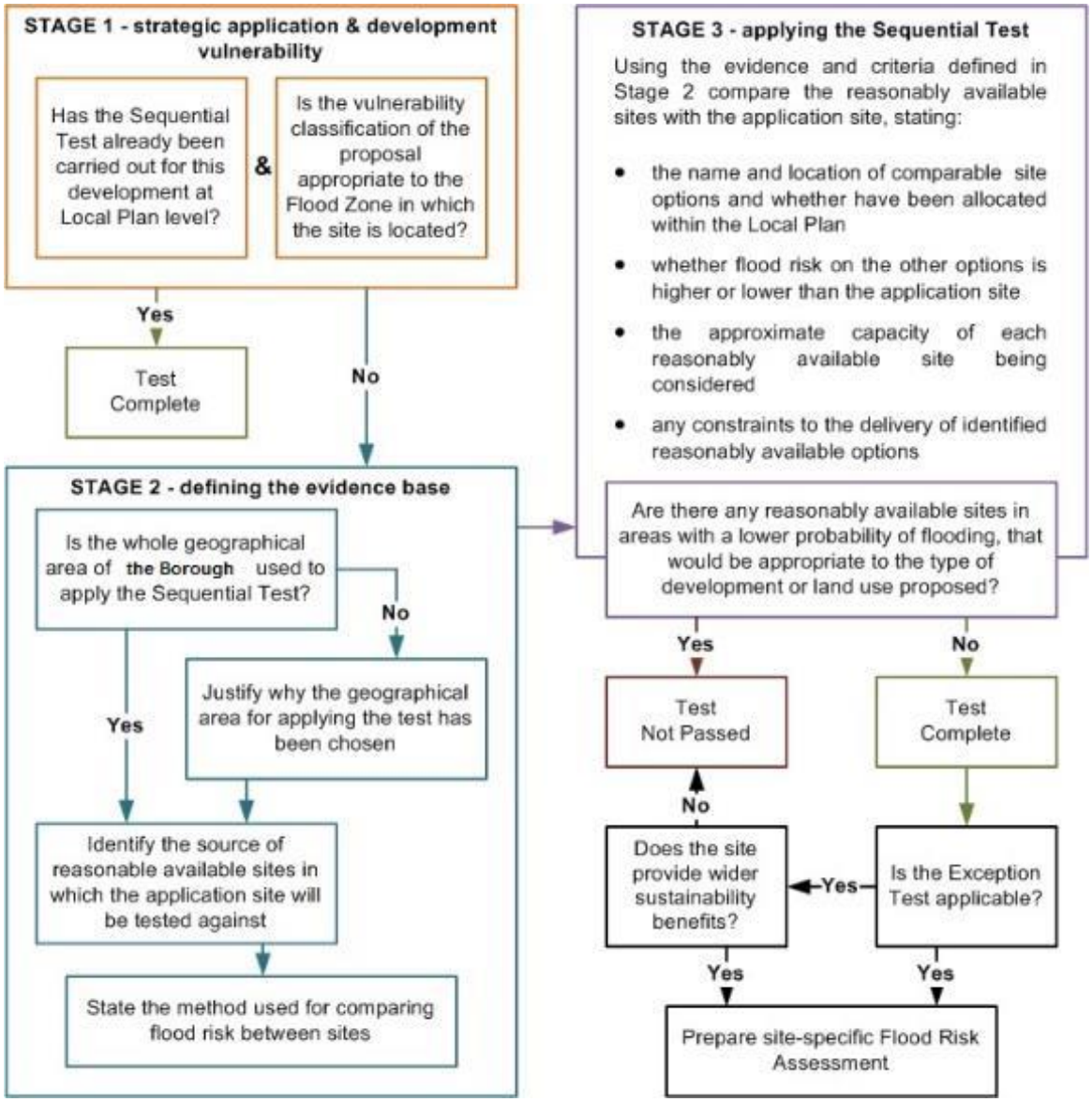
Table 6-9 identifies, for developers, when the Sequential and Exception Tests are required for certain types of development and who is responsible for providing the evidence and those who should apply the tests if required.

Table 6-9: 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 6-3 shows what developers should do with regards to applying the Sequential Test if the LPA has not already done so.

Figure 6-3: 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. More detailed guidance on site-specific FRAs is provided in Section 6.5.4.

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.

6.10 Accounting for climate change

Climate change will increase flood risk over the lifetime of a development. This SFRA has considered a precautionary approach to climate change as modelled climate change outputs are not available for this study. It is often the case that modelled 1 in 1000 AEP event outlines are similar to modelled climate change scenarios for the 1 in 100 AEP event. Therefore, Flood Zones 2 and 3 of the EA's Flood Map for Planning have been used as a climate change proxy to provide an indication of risk to sites in the future.

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 the Flood Zone 3b. Predicting future expansion of the functional floodplain is however more difficult as the functional floodplain extent is based on a number of different criteria, as discussed in Section 5.2.2.

This approach to climate change is precautionary though is considered to be the most pragmatic methodology available. This approach is also consistent with other SFRAs and professional modelling experience. As such, for any sites within Flood Zone 2, the possibility of these sites being within Flood Zone 3a within 100 years' time should be considered.

A more detailed assessment of the impacts of climate change on flooding from the land and rivers should be carried out as part of any Level 2 SFRA or FRA. This should be carried out using the sensitivity ranges presented in this section which will provide an appropriately robust response to the uncertainty about climate change impacts on rainfall intensities, river flows and sea level rise.

Considering the impacts of climate change within a FRA / Level 2 SFRA will have implications for both the type of development that is appropriate according to its vulnerability to flooding and design standards for any SuDS or mitigation schemes proposed. For example, through very flat floodplains, using the +35 per cent from 2070 to 2115 allowance for peak river flows, could see an area currently within lower risk zones (Flood Zone 2), in future be re-classified as lying within a higher risk zone (Flood Zone 3a). Therefore, residential development may not be appropriate without suitable flood mitigation measures or flood resilient or resistant houses. In well-defined floodplains, the same climate change allowance could have significant impacts on flood depths influencing building type and design (e.g. finished floor levels).

6.10.1 Planning for climate change (NPPF, 2018)

In relation to flood risk and climate change in the planning system, the revised NPPF states:

"All plans should apply a sequential, risk-based approach to the location of development – taking into account the current and future impacts of climate change – so as to avoid, where possible, flood risk to people and property." (para 157).

Local plans should do this by safeguarding land from development that is required, or likely to be required, for current or future flood management; and to seek opportunities for the relocation of development, including housing, to more sustainable locations from areas where climate change is expected to increase flood risk.

6.10.2 EA climate change allowances

The EA revised the climate change allowances in 2016 and further updated them in February 2017, for use in FRAs and SFRAs and will use these revised allowances when providing advice:

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

The revised climate change allowances are predictions of anticipated change for:

- Peak river flow by River Basin District;
- Peak rainfall intensity;
- Sea level rise; and
- Offshore wind speed and extreme wave height.

Deciding on which of the peak river flow allowances to use is based on the flood zone the development is within and the associated vulnerability classification (see Table 2 of the FRCC-PPG). Climate change allowances for river flows are based on which River Basin District the river is located within. As discussed, the Borough of Darlington is within the Northumbria RBD.

Table 6-10: Recommended Peak River Flow Allowances for the Northumbria River Basin District

RBD	Allowance Category	Total Potential Change Anticipated for…		
		2020s (2015-2039)	2050s (2040-2069)	2080s (2070-2115)
Northumbria	Upper end	+20%	+30%	+50%
	Higher central	+15%	+20%	+25%
	Central	+10%	+15%	+20%

The peak rainfall intensity allowance applies to the whole of England. SFRAs and FRAs should assess both the central and upper end allowances to gauge the range of impacts.

Table 6-11: Peak Rainfall Intensity Allowance in Small and Urban Catchments for England

Allowance Category	Total Potential Change Anticipated for…		
	2015-2039	2040-2069	2070-2115
Upper end	+10%	+20%	+40%
Central	+5%	+10%	+20%

Allowances for sea level rise are based on different regions of England. The allowances for the North East of England are shown in Table 6-12. The number in brackets is the cumulative sea level rise for each year within each range.

Table 6-12: Sea Level Allowance for North East England

1990 - 2025	2026 - 2055	2056 - 2085	2086 - 2115	Cumulative Rise 1990 - 2115 (metres)
2.5 mm (87.5 mm)	7 mm (210 mm)	10 mm (300 mm)	13 mm (390 mm)	0.99 m

The EA will also require consideration, if appropriate, of the 'high++ allowances' for peak river flows and mean sea level rise where a development is considered to be very sensitive to flood risk and with lifetimes beyond the end of the century. This could include infrastructure projects or developments that significantly change existing settlement patterns. The high++ allowances can be found in the EA's *Adapting to Climate Change: Advice for Flood and Coastal Erosion Risk Management Authorities*[35], which uses science from UKCP09. This guidance is based on Government's policy for climate change adaptation, and is specifically intended for projects or strategies seeking Government Flood Defence Grant in Aid (FDGiA) funding. However, RMAs in England may also find it useful in developing plans and making Flood and Coastal Erosion Risk Management (FCERM) investment decisions even if there is no intention of applying for central government funding. This is important for any future large scale infrastructure used to support the delivery of strategic sites such as flood defence schemes.

Although, it is anticipated that increases in river flows will lie somewhere within the range of the central to upper end estimates of the February 2016 allowances, more extreme change cannot be discounted. The high++ allowances can be used to represent more severe climate change impacts and help to identify the options that would be required. The UKCP09 high++ allowances for peak river flows and relative mean sea level rise are presented in Table 6-13 and Table 6-14 respectively.

UKCP18

In November 2018 Defra released a new set of UK Climate Projections (UKCP18). These projections replace the UKCP09 projections which have been used for the past ten years. The UKCP18 projections show that sea levels around the UK are expected to continue to rise compared to the historical baseline (1981-2000), up to and beyond the end of the 21st century. For the north east, sea levels are expected to increase by between 0.1m and 0.5m under the low emissions scenario and by between 0.3m and 0.9m under the high emissions scenario by 2100.

In terms of applying climate change to SFRAs and FRAs, the EA's February 2016 allowances are, at the time of writing, still the best representation of how climate change is likely to affect flood risk for peak river flows and peak rainfall intensities. Research that is due to be published in Spring 2019 may result in changes to these allowances. The climate change allowances for sea level risk will be updated and published as early as possible in 2019. Until then, it is reasonable to continue to use the sea level rise allowances in 'Flood risk assessments: climate change allowances' (February 2016) for planning decision making (Tables 6-19 and 6-20), because the allowances that have been used to date represent the high end of the range of sea level rise projected by UKCP18.

Table 6-13: UKCP09 High++ Allowances for Peak River Flow per River Basin District

RBD	Total Potential Change Anticipated for…		
	2020s (2015-39)	2050s (2040-69	2080s (2070-2115
North East	+20%	+35%	+65%

Table 6-14: UKCP09 High++ Mean Sea Level Allowance (compared to 1990 baseline, includes land movements)

Sea Level Rise mm/yr up to 2025	Sea Level Rise mm/yr 2026 to	Sea Level Rise mm/yr 2051 to	Sea Level Rise mm/yr 2081 to

35 Environment Agency Adapting to Climate Change: Advice for Flood and Coastal Erosion Risk Management Authorities

	2050	2080	2115
6	12.5	24	33

As discussed, modelled climate change outputs, using the February 2016 allowances, are not available at the time of writing for this Level 1 SFRA. However, any Level 2 assessment, following on from this Level 1, could involve the modelling of appropriate climate change events, where fully functioning EA hydraulic models are available.

6.11 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 then Department for Communities and Local Government (DCLG), now Ministry of Housing Communities and Local Government (MHCLG) announced, in December 2014, that local planners should be responsible for delivering SuDS[36]. 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'[37], published in March 2015. A Practice Guidance[38] document has also been developed by the Local Authority SuDS Officer Organisation (LASOO) to assist in the application of the non-statutory technical standards.

6.11.1 SuDS and the revised NPPF, 2018

The Revised NPPF (2018), para 165, states:

"Major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems used should:

a) take account of advice from the lead local flood authority;

b) have appropriate proposed minimum operational standards;

c) have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and

d) where possible, provide multifunctional benefits".

As since 2014, the NPPF still states only 'major' developments should incorporate SuDS. However, all developments, both major and minor, can include some kind of SuDS, providing multiple benefits that contribute to many other NPPF policies, including climate change. Where site conditions may be more challenging, the type of SuDS may need to be adapted to the site's opportunities and constraints. At a strategic level, this should mean identifying SuDS opportunities according to geology, soil type, topography, groundwater / minewater conditions, their potential impact on site allocation, and setting out local SuDS guidance and opportunities for adoption and maintenance.

In terms of what kind of evidence would show SuDS to be inappropriate for a certain site, it is possible that clarity on what evidence is required may be subsequently set out in the revised FRCC-PPG, and that these circumstances would be exceptional.

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

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

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

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.

Sustainable drainage should form part of an integrated design methodology secured by detailed planning conditions to ensure that the SuDS to be constructed is maintained to a minimum level of effectiveness. Appendix F provides details on SuDS options and suitability.

6.11.2 SuDS hierarchy

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.

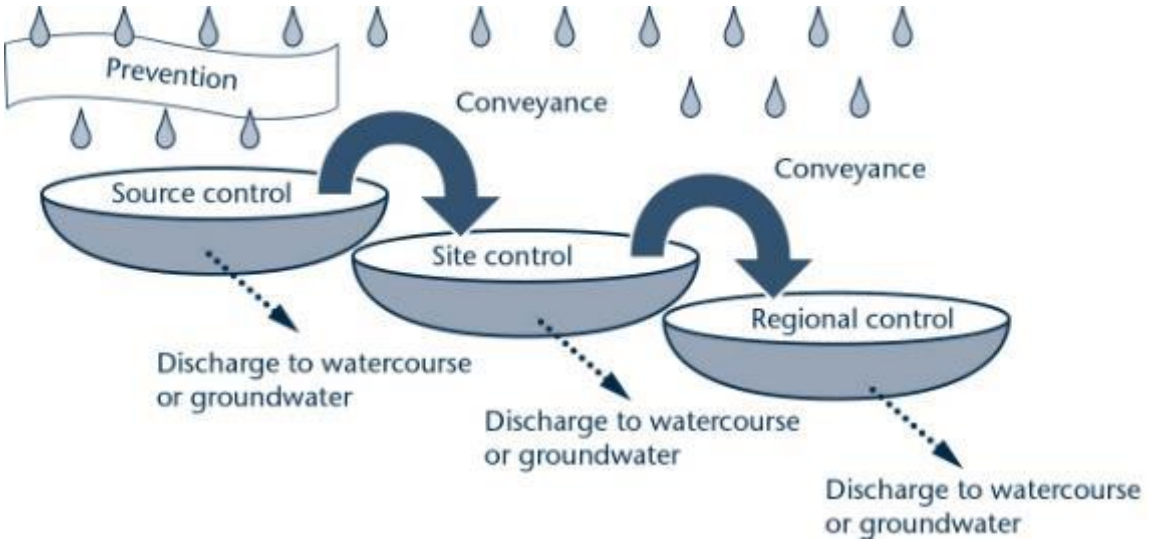
Effects on water quality should also be investigated when considering runoff destination in terms of the potential hazards arising from development and the sensitivity of the runoff destination. Developers should also establish that proposed outfalls are hydraulically capable of accepting the runoff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

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 6-4), will be required, where source control is the primary aim.

Figure 6-4: SuDS Management Train Principle[39]



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 the non-statutory technical standards. More stringent requirements should be considered where current Greenfield sites lie upstream of high risk areas. This could include improvements on Greenfield runoff rates.

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

The Tees Valley Authorities Local Standards for Sustainable Drainage[40], a document produced for the Local Authorities of Hartlepool, Redcar and Cleveland, Middlesbrough, Stockton-on-Tees and Darlington Borough Councils, should be consulted by the LPA, architects, planners, engineers, and developers involved in the preparation of schemes for new development. The document forms the local standards for the five LPAs and, together with the National Standards, strongly promotes the use of SuDS and indicates the minimum standards to ensure a satisfactory scheme is constructed under the FWMA.

The CIRIA SuDS Manual[41] 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.

6.11.3 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.

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

40 Tees Valley Authorities Local Standards for Sustainable Drainage. July 2015.

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

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.

6.11.4 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.

Master planning 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 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.

6.12 Property Flood Resilience (PFR)

Flood resilience and resistance measures are designed to mitigate flood risk and reduce damage and adverse consequences to existing property. Resistance and resilience measures may aim to help residents and businesses recover more quickly following a flood event.

It should be noted that it is not possible to completely prevent flooding to all communities and business.

Research carried out by the then DCLG (now the MHCLG) and the EA has recommended that the use of resistance measures should generally be limited to a nominal protection height of 600 mm above ground level, the lowest point of ground abutting the external property walls. This is because the structural integrity of the property may be compromised above this level.

It should be noted that PFR measures would not be expected to cause an increase in flood risk to other properties or other parts of the local community. They will help mitigate against flood risk but, as with any flood alleviation scheme, flood risk cannot be removed completely. Emergency plans should, therefore, be in place that describe the installation of measures and residual risks.

As the flood risk posed to a property cannot be removed completely, it is recommended that PFR products are deployed in conjunction with pumps of a sufficient capacity. Pumps will help manage residual flood risks not addressed by resistance measures alone such as rising groundwater.

6.12.1 Definitions

Flood resilience measures aim to reduce the damage caused by floodwater entering a property. Flood resilience measures are based on an understanding that internal flooding may occur again and when considering this eventuality, homes and businesses are encouraged to plan for flooding with an aim of rapid recovery and the return of the property to a habitable state.

For example, tiled floors are easier to clean than carpets, raised electricity sockets and high-level wall fixings for TVs / computers may mean that that power supply remains unaffected. Raising kitchen or storage units may also prevent damage that may not require replacement after a flood. There is a lot of information available about what items get damaged by floodwater and features that are considered to provide effective resilience measures that can be installed at a property.

Flood resistance measures aim to reduce the amount of floodwater entering the property. Obvious inflow routes, such as through doors and airbricks may be managed, for example, by installing bespoke flood doors, door flood barriers and automatic closing airbricks. However, the property's condition and construction are also key to understanding how floodwater may enter and move between buildings. For example, flood water can also flow between properties through connecting cavity walls, cellars, beneath suspended floors and through internal walls. Flood resistance measure alone may not keep floodwater out. Building condition is a critical component of any flood mitigation study.

6.12.2 Property mitigation surveys

To define the scale and type of resistance or resilience measures required, a survey will need to be undertaken to pick up property threshold levels, air brick levels, doorways, historic flood levels and a number of ground spot levels required to better understand the flood mechanisms for flood water arriving at the property (e.g. along road, pavements, etc.). The depth of flooding at each property will help guide the selection of resistance measures proposed. Surveys will need to include consideration of issues such as:

- Detailed property information
- An assessment of flood risk, including property (cross) threshold levels
- Routes of water ingress (fluvial, ground and surface water flooding)
- An assessment of impact of flood waters
- A schedule of measures to reduce risk (resistance and resilience)
- Details of recommendations (including indicative costs)
- Advice on future maintenance of measures
- Advice on flood preparedness

All sources of flooding will need to be considered, including a comprehensive survey of openings (doors, windows and air bricks), as well as potential seepage routes through walls and floors, ingress through service cables, pipes, drains and identify possible weaknesses in any deteriorating brickwork or mortar.

The NPPF (2018) states that, where development must be located in an area of flood risk, following application and passing of the Sequential and Exception Tests (if applicable), the development must be appropriately flood resistant and resilient (para 163b).

7 Emergency Planning

The provisions for emergency planning for local authorities as Category 1 responders are set out by the Civil Contingencies Act, 2004 and the National Flood Emergency Framework for England, December 2014[42]. This framework is a resource for all involved in emergency planning and response to flooding from the sea, rivers, surface water, groundwater and reservoirs. The Framework sets out Government's strategic approach to:

- Ensuring all delivery bodies understand their respective roles and responsibilities when planning for and responding to flood related emergencies;
- Giving all players in an emergency flooding situation a common point of reference which includes key information, guidance and key policies;
- Establishing clear thresholds for emergency response arrangements;
- Placing proper emphasis on the multi-agency approach to managing flooding events;
- Providing clarity on the means of improving resilience and minimising the impact of flooding events;
- Providing a basis for individual responders to develop and review their own plans; and
- Being a long-term asset that will provide the basis for continuous improvement in flood emergency management.

Along with the EA flood warning systems, there are a range of flood plans at a sub-regional and local level, outlining the major risk of flooding and the strategic and tactical response framework for key responders.

This SFRA contains useful data to allow emergency planning processes to be tailored to the needs of the area and be specific to the flood risks faced. The SFRA Maps in Appendix A and accompanying GIS layers should be made available for consultation by emergency planners during an event and throughout the planning process.

7.1 Civil Contingencies Act

Under the Civil Contingencies Act (CCA, 2004)[43], the LLFA and LPAs are classified as Category 1 responders and thus have duties to assess the risk of emergencies occurring, and use this to:

- Inform contingency planning;
- Put in place emergency plans;
- Put in place business continuity management arrangements;
- Put in place arrangements to make information available to the public about civil protection matters;
- Maintain arrangements to warn, inform and advise the public in the event of an emergency;
- Share information with other local responders to enhance coordination; and
- Cooperate with other local responders to enhance coordination and efficiency and to provide advice and assistance to businesses and voluntary organisations about business continuity management.

During an emergency, such as a flood event, the local authority must also co-operate with other Category 1 responders (such as the emergency services and the EA) to provide the core response.

7.1.1 County Durham and Darlington Local Resilience Forum

The role of the County Durham and Darlington Local Resilience Forum (LRF)[44] (LRF) is to ensure an appropriate level of preparedness to enable an effective multi-agency response to emergency incidents that may have a significant impact on the communities of Darlington Borough Council and Durham County Council. The LRF consists of Darlington Borough Council, Durham

42 https://www.gov.uk/government/publications/the-national-flood-emergency-framework-for-england

43 https://www.gov.uk/preparation-and-planning-for-emergencies-responsibilities-of-responder-agencies-and-others#the-civil-contingencies-act

https://www.durham.police.uk/Information-and-advice/Pages/Local-Resilience-Forum.aspx

Constabulary, Durham County Council, County Durham and Darlington Fire and Rescue Service, NHS England, County Durham and Darlington Civil Contingences Unit, the EA, Public Health England, Resilience Emergency Divison North, Military, British Red Cross and the Maritime and Coastguard Agency.

7.1.1.1 County Durham and Darlington Community Risk Register

As a strategic decision-making organisation, the LRF prepared a Community Risk Register (CRR)[45], last updated in April 2017, which considers the likelihood and consequences of the most significant risks and hazards the area faces, including fluvial and urban flooding. This SFRA can help to inform this. The CRR is considered as the first step in the emergency planning process and is designed to reassure the local community that measures and plans are in place to respond to the potential hazards listed within the CRR.

7.1.1.2 Community Emergency Plan

Communities may need to rely on their own resources to minimise the impact of an emergency, including a flood, before the emergency services arrive. Many communities already help each other in times of need, but experience shows that those who are prepared cope better during an emergency. Communities with local knowledge, enthusiasm and information are a great asset and a Community Emergency Plan can help. Details on how to produce a community emergency plan, including a toolkit and template, are available from Government's website[46]. DBC has also produced a document on emergency management steps, which is available from:

http://www.darlington.gov.uk/your-council/council-information/the-community-risk-register/emergency-management-steps/

County Durham and Darlington have provided information on how to prepare your community for an emergency at:

https://www.durham.gov.uk/media/5182/10-Step-Guide-Community-Emergency-Plan/pdf/CommunityEmergencyPlan10StepGuide.pdf

DBC has provided advice on how to prepare for floods, available from:

http://www.darlington.gov.uk/your-council/council-information/the-community-risk-register/what-can-you-do-to-be-better-prepared-in-your-home/

7.1.2 Local Flood Plans

This SFRA provides a number of flood risk data sources that should be used when producing or updating flood plans. The LPA will be unable to write their own specific flood plans for new developments at flood risk. Developers should write their own. Generally, owners with individual properties at risk should write their own individual flood plans, however larger developments or regeneration areas, such as retail parks, hotels and leisure complexes, should consider writing one collective plan for the assets within an area.

This SFRA can help to:

- Update these flood plans if appropriate;
- Inform emergency planners in understanding the possibility, likelihood and spatial distribution of all sources of flooding (emergency planners may however have access to more detailed information, such as for Reservoir Inundation Maps, which have not been made available for this SFRA);
- Identify safe evacuation routes and access routes for emergency services;
- Identify key strategic locations to be protected in flooding emergencies, and the locations of refuge areas which are capable of remaining operational during flood events;
- Provide information on risks in relation to key infrastructure, and any risk management activities, plans or business continuity arrangements;

45https://www.durham.police.uk/Information-and-advice/Documents/38697%20County%20and%20Darlington%20Risk%20Register%20April%202017%20version%201.0.pdf

46 https://www.gov.uk/guidance/resilience-in-society-infrastructure-communities-and-businesses#community-resilience

- Raise awareness and engage local communities;
- Support emergency responders in planning for and delivering a proportionate, scalable and flexible response to the level of risk; and
- Provide flood risk evidence for further studies.

7.2 Flood Warning and Evacuation Plans

Developments that include areas that are designed to flood (e.g. ground floor car parking and amenity areas) or have a residual risk associated with them, will need to provide appropriate flood warning and instructions so users and residents are safe in a flood. This will include both physical warning signs and written flood warning and evacuation plans. Those using the new development should be made aware of any evacuation plans.

In relation to new development it is up to the LPA to determine whether the flood warning and evacuation plans, or equivalent procedures, are sufficient or not. If the LPA is not satisfied, taking into account all relevant considerations, that a proposed development can be considered safe without the provision of safe access and exit, then planning permission should be refused.

Whilst there is no statutory requirement on the EA or the emergency services to approve evacuation plans, LPAs are accountable under their Civil Contingencies duties, via planning condition or agreement, to ensure that plans are suitable. This should be done in consultation with development management officers. Given the cross cutting nature of flooding, it is recommended that further discussions are held internally to the LPA between emergency planners and policy planners / development management officers, the LLFA, drainage engineers and also to external stakeholders such as the emergency services, the EA, NW, Internal Drainage Boards and Canal & River Trust (if applicable).

It may be useful for both the LLFA and spatial planners to consider whether, as a condition of planning approval, flood evacuation plans should be provided by the developer which aim to safely evacuate people out of flood risk areas, using as few emergency service resources as possible. The application of such a condition is likely to require policy support in DBC's Local Plan, and discussions within the County Durham and Darlington Local Resilience Forum are essential to establish the feasibility / effectiveness of such an approach, prior to it being progressed. It may also be useful to consider how key parts of agreed flood evacuation plans could be incorporated within local development documents, including in terms of protecting evacuation routes and assembly areas from inappropriate development.

Once the development goes ahead, it will be the requirement of the plan owner (developer) to make sure the plan is put in place, and to liaise with the LPA and LLFA regarding maintenance and updating of the plan.

7.2.1 What should the Plan Include?

Flood warning and evacuation plans should include the information stated in Table 7-1. Advice and guidance on plans is accessible from the EA website and there are templates available for businesses and local communities.

Table 7-1: Flood warning and evacuation plans

Consideration	Purpose
Availability of existing flood warning system	The EA offers a flood warning service that currently covers designated Flood Warning Areas in England and Wales. In these areas, they are able to provide a full Flood Warning Service.
Rate of onset of flooding	The rate of onset is how quickly the water arrives and the speed at which it rises which, in turn, will govern the opportunity for people to effectively prepare for and respond to a flood. This is an important factor within Emergency Planning in assessing the response time available to the emergency services.
How flood warning is given and occupants awareness of the likely frequency and duration of flood events	Everyone eligible to receive flood warnings should be signed up to the EA flood warning service. Where applicable, the display of flood warning signs should be considered. In particular sites that will be visited by members of the public on a daily basis such as

Consideration	Purpose
	sports complexes, car parks, retail stores. It is envisaged that the responsibility should fall upon the developers and should be a condition of the planning permission. Information should be provided to new occupants of houses concerning the level of risk and subsequent procedures if a flood occurs.
The availability of staff / occupants / users to respond to a flood warning and the time taken to respond to a flood warning	The plan should identify roles and responsibilities of all responders. The use of community flood wardens should also be considered.
Designing and locating safe access routes, preparing evacuation routes and the identification of safe locations for evacuees	Dry routes will be critical for people to evacuate as well as emergency services entering the site. The extent, depth and flood hazard rating, including allowance for climate change, should be considered when identifying these routes.
Vulnerability of occupants	Vulnerability classifications associated with development as outlined in the FRCC-PPG. This is closely linked to its occupiers.
How easily damaged items will be relocated and the expected time taken to re-establish normal use following an event	The impact of flooding can be long lasting well after the event has taken place affecting both the property which has been flooded and the lives that have been disrupted. The resilience of the community to get back to normal will be important including time taken to repair / replace damages.

7.2.2 EA Flood Warning Areas and flood awareness

The EA monitor river levels within the main rivers affecting the Borough and based upon weather predictions provided by The Met Office, making an assessment of the anticipated maximum water level that is likely to be reached within the proceeding hours (and/or days). Where these predicted water levels are expected to result in inundation of a populated area, the EA will issue a series of flood warnings within defined Flood Warning Areas (FWA), encouraging residents to take action to avoid damage to property in the first instance.

More information on flood warning is provided by the EA via:

https://www.gov.uk/government/publications/flood-warnings-what-they-are-and-what-to-do

There are six EA Flood Warning Areas (FWA) in operation across Darlington. Three of these are located along the River Skerne, in the urban centre of Darlington to ensure protection to properties and businesses in the town. The remaining three FWA's are located on the River Tees at Neasham, near The Old Stables and on the confluence of the Rivers Tees and Skerne.

Live information on flood warnings and flood alerts is available via:

https://flood-warning-information.service.gov.uk/

Emergency planners may also use the outputs from this SFRA to raise awareness within local communities. This should include raising awareness of flood risks, roles and responsibilities and measures that people can take to make their homes more resilient to flooding from all sources whilst also encouraging all those at fluvial flood risk to sign up to the EA's Flood Warning service[47].

It is also recommended that Category 1 responders are provided with appropriate flood response training to help prepare them for the possibility of a major flood with an increased number of people living within flood risk areas, to ensure that adequate pre-planning, response and recovery arrangements are in place.

47 https://www.gov.uk/sign-up-for-flood-warnings

8 Conclusions and Recommendations

8.1 Conclusions

This SFRA provides a single repository planning tool relating to flood risk and development in the borough of Darlington. Key flood risk stakeholders namely the EA, Stockton-on-Tees Borough Council as the Lead Local Flood Authority and Northumbrian Water, 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 potential Local Plan development sites, with subsequent strategic recommendations.

The flood risk information, assessment, guidance and recommendations of the SFRA will provide the LPA with the evidence base required to apply the Sequential Test, 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 some locations where the council is looking for continued growth and/or regeneration, this will not always be possible. This SFRA therefore provides the necessary links between spatial development, wider flood risk management policies, local strategies and plans and on the ground works by combining all available flood risk information together into one single repository. As this is a 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 may be carried out following on from the completion of a Level 1 assessment, if required.

8.2 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 (2018) and FRCC-PPG, unless in exceptional circumstances such as for essential infrastructure, which must still pass the Exception Test, 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 the storage of floodwater. Sites within Flood Zone 3b may still be developable if the site boundary can be removed from the floodplain or the site can accommodate the risk on site and keep the area free from development.

Policy Recommendation 2: Consider surface water flood risk…

…with equal importance alongside fluvial and tidal risk including possible withdrawal, redesign or relocation for sites at significant surface water risk.

All new development should adhere to the applicable runoff rate allowances stated by the LLFA.

FRAs 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 NW 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 NW.

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
- Within Flood Zone 1 and 1 hectare or greater in size
- At risk from surface water flooding or on land which has been identified by the EA as having critical drainage problems (i.e. within a ACDP)
- Situated in an area currently benefitting from defences
- Situated over a culverted watercourse or where development will be required to control or influence the flow of any watercourse
- Land identified as being at increased flood risk in future
- At risk of flooding from other sources of flooding or at residual risk
- Subject to a change of use to a higher vulnerability classification which may be subject to other sources of flooding
- Situated in an area currently benefitting from defences
- Within a council designated CDA; or
- 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.

Before deciding on the scope of the FRA, this SFRA should be consulted along with the LPA, LLFA and NW. The FRA should be submitted to and be approved by the LPA including suitable consultation with the LLFA and the EA and any other applicable parties.

Policy Recommendation 5: Use of appropriately sourced 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.

As per the NPPF (2018), in terms of SuDS, development in areas at flood risk should only be permitted where SuDS are incorporated into the design, unless clear evidence suggests this would be inappropriate.

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

The LPA, LLFA, NW 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.

Appropriate guidance should always be followed, as referenced within this SFRA.

Policy Recommendation 6: Natural Flood Management techniques…

…should be considered, where possible, to aid with flood alleviation and implementation of suitable SuDS, depending on the location.

The national NFM / WwNP mapping should be consulted in the first instance, followed by local investigation into whether such techniques are appropriate and whether the benefits are proportionate to the work required to carry out the identified WwNP approaches.

Policy Recommendation 7: Phasing of development…

…should be carried out by the LPA on a site by site based and also within sites by the developer to avoid any cumulative impacts of flood risk (reinforced by the revised NPPF (2018).

Using a phased approach to development, should ensure that any sites at risk of causing flooding to other sites are developed first to ensure that 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 put in place at sites upstream could alleviate flooding at downstream or nearby sites.

Development phasing within large strategic sites of multiple developments should also be considered where parts of such sites are at flood risk.

Policy Recommendation 8: 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, the EA, and NW, if applicable
- The effects of climate change have been taken into account using the February 2016 allowances developed by the EA
- There is no net loss in any floodplain storage resulting from the development
- The development will not 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
- Appropriate SuDS techniques have been considered and are to be incorporated into the design of the site, where applicable
- Safe access and egress routes are in place during a flood event
- The development will be safe for its lifetime and has passed the Sequential Test Exception Test, if applicable.

8.3 Recommendations for Further Work

The SFRA process has developed into more than just a planning tool. Sitting alongside the Local Flood Risk Management Strategy, Sustainability Appraisal and Flood Risk Management Plan, 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 8-1 that may be of benefit to the LPA, in developing their flood risk evidence base to support the delivery of their Local Plan, or to the LLFA to help fill critical gaps in flood risk information.

Table 8-1: Recommended further work for DBC alongside the LLFA

Type	Works	Explanation	Timeframe
Understanding of local flood risk	Level 1 SFRA update	As and when new potential development sites, flood risk information or policy becomes available	As required
	EA Flood Risk Mapping updates	EA modelling updates of older models where Flood Zone 3b has not changed since 2009. 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	For those high surface water risk sites / areas as notified by this Level 1 SFRA	Short term
Climate change (February 2016 allowances)	Level 2 SFRA	Modelling of climate change using existing EA models in the borough	Short term
Critical Drainage Area / Area with Critical Drainage Problems	Level 2 SFRA	Exploration of the possibility of designating CDAs/ACDPs for use on development restrictions in Local Plan	Short term
Flood storage and	Community Infrastructure	For new developments, GI assets can be secured from a landowner's 'land value	Short term

Type	Works	Explanation	Timeframe
attenuation	Levy (CIL) / Working with Natural Processes	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.	
	Natural Flood Management	Promote removal of existing defences and reconnecting the floodplain, where the research indicates that it would be beneficial in Darlington Catchments	Ongoing
Data Collection	Flood Incident Data	DBC, as LLFA, have a duty to request SBC to investigate and record details of locally significant flood events within its area. 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. SBC will investigate and produce a report / provide advice for DBC	Short term
	FRM Asset Register	DBC should update and maintain a flood risk management register of structures and features, which are considered to have an effect on flood risk.	Ongoing - http://public.gismapp.com/darlington
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
	Resilience	Ensure that key infrastructure can operate during flooding or recover rapidly after flooding. This will assist in making communities more resilient to flooding and speeds up the recovery process.	Ongoing
Risk assessment	Asset Register Risk Assessment	The LLFA should carry out a strategic assessment of structures and features on its FRM Asset Register to inform capital programme and prioritise maintenance programme.	Short term
Capacity	SuDS review / guidance	DBC should clearly identify its requirements of developers for SuDS in new developments in collaboration with SBC. Internal capacity, within DBC should be in place to deal with SuDS applications, set local specification and set policy for adoption and future maintenance of SuDS.	Short term
Partnership	NW	DBC and SBC should continue to collaborate with NW on sewer and surface water projects.	Ongoing
	EA	SBC and DBC should continue to work with the EA on fluvial flood risk management projects. Potential opportunities for joint schemes to tackle flooding from all sources should be identified.	Ongoing
	Community	Continued involvement with the community through SBC's and DBC's existing flood risk partnerships.	Ongoing

8.3.1 Level 2 SFRA

The LPA should review the sites where they expect the main housing numbers and employment sites to be delivered, using Section 6.4 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 strategic planning objectives, which means they cannot be relocated or avoided. 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 when considering options for future work.

As discussed in Section 6.10, a Level 2 assessment can be used to model the February 2016 climate change allowances, where current EA models are available.

A Level 2 SFRA should build on the source information provided in this Level 1 assessment and should indicate the likelihood of a site passing the Exception Test as part of a FRA.

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 numbers, economic needs 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.

Appendices

A SFRA Maps

Interactive GeoPDF Maps

Open the Index Map in Adobe Acrobat (2017s6627_DarlingtonBC_SFRA_Index.pdf). The Index Map contains a set of index squares covering the borough. Each of the index squares cover different areas of the borough 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 (in Adobe Acrobat) 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 1, 2, 3a and 3b, as delineated through this SFRA, and also the Risk of Flooding from Surface Water (RoFSW).

C Functional Floodplain Update

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

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