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# Harrogate Borough Council Level 1 Strategic Flood Risk Assessment

Final Report

September 2016

**Harrogate**  
BOROUGH COUNCIL

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Planning and Development  
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## Revision History

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Final v2.0 / 26 September 2016	LPA, LLFA, EA comments on Initial Draft addressed	Simon Hartley (LPA)

## Contract

This report describes work commissioned by Simon Hartley, on behalf of Harrogate Borough Council, by a letter dated 21 June 2016. Harrogate Borough Council’s representative for the contract was Simon Hartley. Mike Williamson 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 Harrogate Borough Council.

## Acknowledgements

JBA would like to thank all Harrogate Borough Council, North Yorkshire County Council, Environment Agency and Yorkshire 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) updates the previous Level 1 assessment published in 2010 using up-to-date flood risk information together with the most current flood risk and planning policy available from the National Planning Policy Framework<sup>1</sup> (NPPF) and Flood Risk and Coastal Change Planning Practice Guidance<sup>2</sup> (FRCC-PPG). Harrogate Borough Council (HBC) requires this update to initiate the sequential risk-based approach to the allocation of land for development and to identify whether application of the Exception Test is likely to be necessary. This will help to inform and to provide the evidence base for the Harrogate District Local Plan.

Harrogate Borough Council provided their latest potential sites data and information. An assessment of flood risk to all sites is provided to assist HBC in their decision making process for sites to take forward as part of their Local Plan.

The aims and objectives of this SFRA update are:

- To form part of the evidence base and inform the Sustainability Appraisal (Incorporating the Strategic Environmental Assessment) for the council's Local Plan.
- To reflect current national policy documentation including the NPPF and its accompanying Flood Risk and Coastal Change Planning Practice Guidance to enable HBC to meet its obligations as defined by the NPPF.
- To supplement current policy guidelines and to provide a straightforward risk based approach to development management in the area.
- To make recommendations on the suitability of potential development sites based on flood risk for HBC's Local Plan.
- To understand current flood risk from all sources and any historic and future flood risk information to enable investigation and identification of the extent and severity of flood risk throughout the district. This assessment will enable HBC to steer development away from those areas where flood risk is considered greatest, ensuring that areas allocated for development can be developed in a safe, cost effective and sustainable manner.
- To consider a precautionary approach to climate change.
- 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 updated Flood Map for Surface Water (uFMfSW).
- 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 and the basis for site-specific Flood Risk Assessments (FRAs) where necessary.
- To provide a suite of interactive GeoPDF flood risk maps illustrating the interaction between flood risk and potential development sites.
- To identify land required for current and future flood management that should be safeguarded as set out in the NPPF.

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

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



A number of potential development sites are shown to be at varying risk from fluvial, tidal, surface water flooding and residual risk. Table 1-1 summarises the number of sites at risk from each flood zone as per the Environment Agency's Flood Map for Planning.

Table 1-1: Number of Potential Development Sites at Risk from Flood Map for Planning Flood Zones

Potential Development Site	Number of sites within...				
	Flood Zone 1*	Flood Zone 2	Flood Zone 3a	Flood Zone 3ai	Flood Zone 3b
Residential	329	57	48	13	20
Employment	16	2	2	0	1
Mixed use	21	15	14	6	9
Gypsy & traveller	1	0	0	0	0
<b>TOTAL</b>	<b>367</b>	<b>74</b>	<b>64</b>	<b>19</b>	<b>30</b>
*Sites with 100% area within Flood Zone 1					

(Sites provided by the Council from the Strategic Housing and Economic Land Availability Assessment 2016 - see Section 6.4 for more details).

Recommendations, in Section 6.5 of this report, are made for each site at risk, broadly entailing the following:

- Consider withdrawing the site based on level or flood risk;
- Exception Test required if site passes Sequential Test;
- Consider site layout and design if site passes Sequential Test;
- Site-specific FRA required; and
- Site permitted on flood risk grounds due to no perceived risk, subject to consultation with the LPA / LLFA.

Out of the 449 sites provided for assessment by HBC, 30 are within or partially within the functional floodplain (Flood Zone 3b), delineated from this SFRA. Out of these 30 sites, eight are recommended for withdrawal where the level of risk is considered too great for development to proceed. There are a further 20 sites that are recommended for withdrawal based on significant surface water flood risk.

Included along with this report as part of the SFRA 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;
- A note on the delineation of the functional floodplain following discussion and agreement between HBC and the EA - Appendix C; and
- Harrogate Borough Council Supporting Drainage Information Chart for Planning Applications - Appendix D.

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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
CC.....	Climate change
CCA .....	Civil Contingencies Act
CDA .....	Critical Drainage Area
CFMP .....	Catchment Flood Management Plan
CIL .....	Community Infrastructure Levy
CSO .....	Combined Sewer Overflow
DCLG .....	Department for Communities and Local Government
DPD .....	Development Plan Documents
DTM .....	Digital Terrain Model
EA .....	Environment Agency
FAA.....	Flood Alert Area
FCA.....	Flood Consequence Assessment
FCDPAG .....	Flood and Coastal Defence Project Appraisal Guidance
FCERM .....	Flood and Coastal Erosion Risk Management Network
FDGiA .....	Flood Defence Grant in Aid
FEH.....	Flood Estimation Handbook
FRA.....	Flood Risk Assessment
FRCC-PPG .....	Flood Risk and Coastal Change Planning Practice Guidance
FRM .....	Flood Risk Management
FRMP .....	Flood Risk Management Plan
FRMS.....	Flood Risk Management Strategy
FRR.....	Flood Risk Regulations
FSA.....	Flood Storage Area
FWA .....	Flood Warning Area
FWMA.....	Flood and Water Management Act
GI .....	Green Infrastructure
GIS.....	Geographical Information Systems
HBC .....	Harrogate Borough Council
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
NGO .....	Non-Governmental Organisation
NPPF .....	National Planning Policy Framework
NYCC .....	North Yorkshire County Council
NYFRS .....	North Yorkshire Fire and Rescue Service
PCPA .....	Planning and Compulsory Purchase Act
PFRA .....	Preliminary Flood Risk Assessment
RBD .....	River Basin District
RBMP .....	River Basin Management Plan
RMA .....	Risk Management Authority
RoFRS .....	Risk of Flooding from Rivers and the Sea Map
RSS .....	Regional Spatial Strategy
SA .....	Sustainability Appraisal
SEA .....	Strategic Environmental Assessment
SFRA .....	Strategic Flood Risk Assessment
SHELAA .....	Strategic Housing and Economic Land Availability Assessment
SoP .....	Standard of Protection
SPD .....	Supplementary Planning Documents
SuDS .....	Sustainable Drainage Systems
SWMP .....	Surface Water Management Plan
UDP .....	Unitary Development Plan
uFMfSW .....	updated Flood Map for Surface Water
UKCIP02 .....	UK Climate Projections 2002
UKCP09 .....	UK Climate Projections 2009
WFD .....	Water Framework Directive
YWS .....	Yorkshire Water Services

# 1 Introduction

Harrogate Borough Council (HBC) is part of a two-tiered local government system with HBC acting as the Local Planning Authority (LPA) and North Yorkshire County Council (NYCC) the Lead Local Flood Authority (LLFA). As LPA, HBC requires a Strategic Flood Risk Assessment (SFRA) to develop the evidence base for the emerging Harrogate District Local Plan and accompanying Sustainability Appraisal. NYCC, as LLFA, is responsible for managing flood risk from ordinary watercourses, surface water and groundwater whilst also being a statutory consultee on all major planning applications submitted to the LPA.

## 1.1 Commission

HBC commissioned JBA Consulting by letter dated 21 June 2016 to undertake an update of the existing North West Yorkshire Level 1 Strategic Flood Risk Assessment (SFRA) completed in July 2010. At the time of writing, HBC is in the process of preparing its new Local Plan which will take forward a new spatial strategy for the District and will include the allocation of sites and detailed policies to guide development. As such, the Local Plan will play a direct role in delivering the district's regeneration and growth objectives which will be informed by this Level 1 SFRA update. The new Local Plan will replace the current Local Plan, adopted in 2001, Selective Alteration adopted in 2004 and the current Core Strategy, adopted in 2009.

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

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

This updated SFRA makes use of the most up-to-date flood risk datasets to assess the extent of risk, at a strategic level, to potential development allocation sites identified by HBC. Included within the SFRA are this report together with appendices containing SFRA maps showing the potential sites overlaid with the latest, readily available, gathered flood risk information and a Development Site Assessment spreadsheet indicating the level of flood risk to each site following a strategic assessment of risk. This information will allow HBC to identify the strategic development options that may be applicable to each site and to inform on the need for the application of the Sequential Test.

## 1.2 Harrogate Borough Council Level 1 SFRA Update

The 2010 Level 1 SFRA Update was undertaken jointly with Craven and Richmondshire District Councils. Due to the differing timescales of Local Plan production this update is being undertaken for Harrogate District alone. HBC, as LPA requires a SFRA to develop the evidence base for their new Local Plan and to inform the Sustainability Appraisal (SA). This SFRA update is required 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. NYCC as the LLFA will also need to be involved throughout the process, co-ordinating views and activity with HBC.

### 1.2.1 Scope and Objectives:

The objectives of this Level 1 SFRA update are:

- To understand flood risk from all sources and to investigate and identify the extent and severity of flood risk throughout the district. This assessment will enable HBC to steer development away from those areas where flood risk is considered greatest, ensuring that areas allocated for development can be developed in a safe, cost effective and sustainable manner.
- To form part of the evidence base and inform the Sustainability Appraisal (Incorporating the Strategic Environmental Assessment) for the council's new Local Plan.

<sup>3</sup> <http://planningguidance.communities.gov.uk/blog/policy/>  
2016s4478 HBC Level 1 SFRA Final Report v2.0.doc

- To make recommendations on the suitability of potential development sites based on flood risk for HBC's Local Plan.
- To provide guidance for developers and planning officers dealing with applications as well as for NYCC to fulfil its role as LLFA including consultation on planning applications for the approval of SuDS schemes.
- To pay particular attention to surface water flood risk, using the EA's third generation updated Flood Map for Surface Water (uFMfSW).
- To enable HBC to meet its obligations under the NPPF.
- To supplement current policy guidelines and to provide a straightforward risk based approach to development management in the area.
- 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 and the basis for site-specific Flood Risk Assessments (FRAs) where necessary.
- To identify land required for current and future flood management that should be safeguarded as set out in the NPPF.
- To advise on the applicability of Sustainable Drainage Systems (SuDS) for managing surface water runoff.
- To assist HBC in identifying specific locations where further and more detailed flood risk data and assessment work may be required as part of a Level 2 SFRA or sequential test, prior to the allocation of specific developments.

This report begins by outlining the connections between the planning framework and flood risk policy thus discussing legislation, planning policy, flood risk management policy and the roles and responsibilities of key stakeholders. All available sources of flood risk within the local authority area are then examined before an assessment of flood risk to the potential development sites. Conclusions and recommendations are cited at the end of the report.

### 1.3 SFRA Future Proofing

As discussed, 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 (HBC) that the latest information is being used when decisions concerning development and flood risk are being made. The Flood Risk and Coastal Change Planning Practice Guidance (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, in which case an immediate review should be undertaken.

This SFRA uses the EA's Flood Map for Planning version issued in February 2016 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 February 2016.

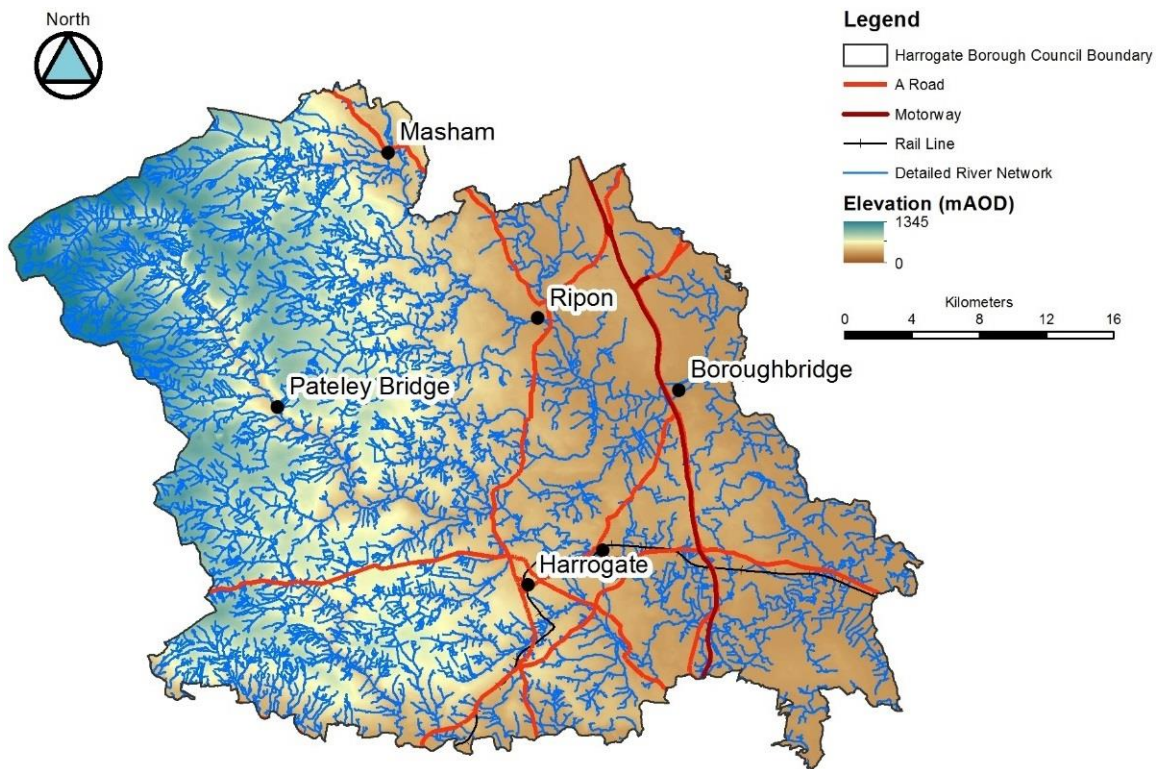
<http://apps.environment-agency.gov.uk/wiyby/37837.aspx>

## 2 Study Area

According to the 2011 census population estimates<sup>4</sup>, 157,869 people live in Harrogate District. The district covers approximately 130,794 hectares of land and is characterised by attractive countryside, varied landscapes and historic and diverse settlements. The Borough includes the towns of Harrogate, Ripon, Pateley Bridge, Boroughbridge, Knaresborough and Masham. Almost all of the Nidderdale Area of Outstanding Natural Beauty (AONB) lies within the council region. Harrogate is the central urban area of the district.

The borough is split by high land in the west associated with the Nidderdale AONB and lower land towards the east of the district. The Main Rivers of the Rivers Nidd and Ure pass through the district and the River Wharfe flows easterly along the southern boundary of the district with the Rivers Swale and Ouse flowing in a southerly direction along the eastern boundary. There are a number of ordinary watercourses within the district along with canalised sections of watercourse, namely Ripon Canal and the Ure Navigation. Ordinary watercourses are any watercourses that are not designated Main River. These watercourses can vary in size considerably and can include rivers and streams and all ditches, drains, cuts, culverts, dikes, sluices, sewers (other than public sewers within the meaning of the Water Industry Act 1991) and passages, through which water flows.

Figure 2-1: Harrogate Borough Council SFRA study area



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As can be seen in Figure 2-1, the topography of the district is varied with higher ground broken up by river valleys to the west and lower ground to the east. To the west the bedrock geology predominantly consists of millstone grit - mudstone, siltstone and sandstone and the east of interbedded sandstone and conglomerate. The bedrock is predominantly overlain by superficial deposits of till.

<sup>4</sup> <http://www.ons.gov.uk/ons/guide-method/census/2011/index.html>  
2016s4478 HBC Level 1 SFRA Final Report v2.0.doc

## 3 Understanding Flood Risk

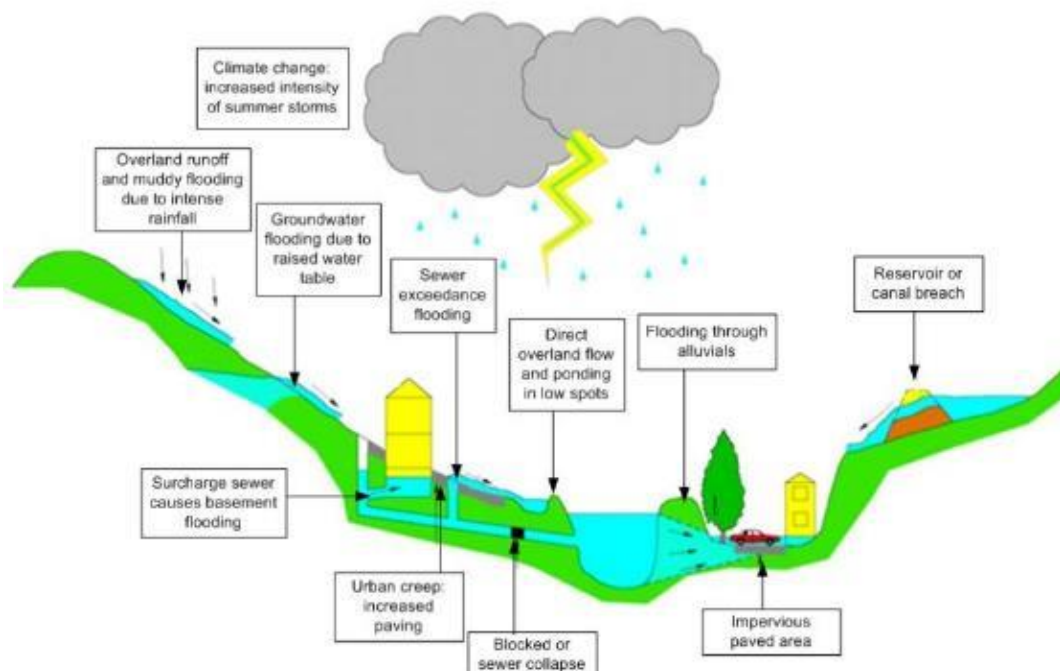
### 3.1 Sources of Flooding

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 include (also see Figure 3-1):

- **Fluvial** (rivers) - 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

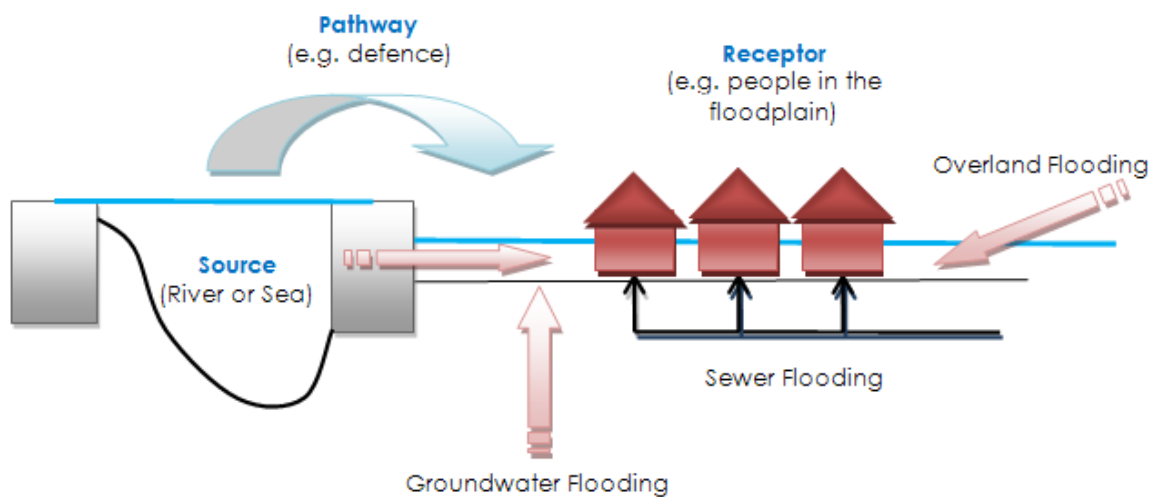




### 3.2 Likelihood and Consequence

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 Flood Zones as defined in the FRCC-PPG and as used by the EA in their Flood Map for Planning (Rivers and Sea)<sup>5</sup>.

<sup>5</sup> [http://maps.environment-agency.gov.uk/wiyby/wiybyController?x=357683.0&y=355134.0&scale=1&layerGroups=default&ep=map&textonly=off&lang=\\_e&to pic=floodmap](http://maps.environment-agency.gov.uk/wiyby/wiybyController?x=357683.0&y=355134.0&scale=1&layerGroups=default&ep=map&textonly=off&lang=_e&to pic=floodmap)



Table 3-1: NPPF Flood Zones<sup>6</sup>

Flood Zone	Annual Probability of Flooding
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 EA. (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, 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 sites, 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 taken into account.

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".*

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 to satisfy the second part of the Exception Test (see Section 6.7.1). 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

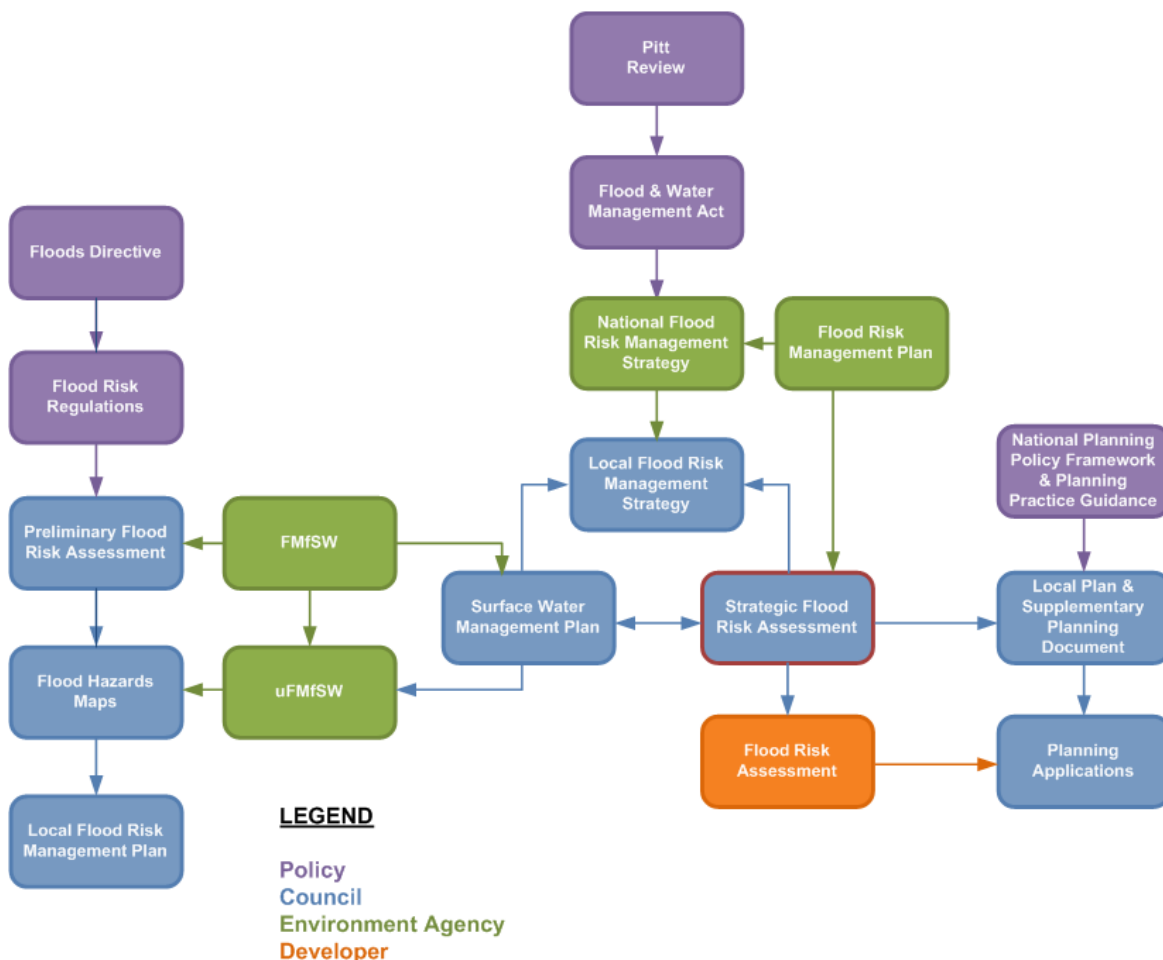
## 4.1 Introduction

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 HBC's responsibilities and duty 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 SFRA's can provide much of the base data required to support the delivery of the council'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 HBC'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 (FRR) 2009 which require Lead Local Flood Authorities (LLFAs) and the EA to produce Flood Risk Management Plans (FRMPs).

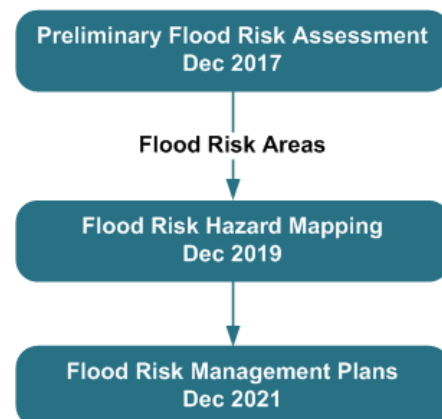
The Directive puts in place a six year cycle of producing Preliminary Flood Risk Assessments (PFRAs) with the aim of identifying significant Flood Risk Areas, prepare flood hazard and risk maps and prepare Flood Risk Management Plans (FRMPs). The first six year cycle was completed in December 2015 and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

PFRAs should cover the entire area for local flood risk (focusing on ordinary watercourses, surface water and groundwater flooding). Where significant Flood Risk Areas are identified using a 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.

The FRMP would need to consider objectives for flood risk management (reducing the likelihood and consequences of flooding) and measures to achieve those objectives.

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.

Figure 4-2: EU Floods Directive



#### 4.2.1.1 North Yorkshire County Council Preliminary Flood Risk Assessment

The NYCC PFRA, published in August 2011 as required under the FRR, stated local sources of flooding, excluding Main River, to include surface water, ordinary watercourses, groundwater and canals. The NYCC PFRA covered all seven North Yorkshire LPAs, including Harrogate District.

The PFRA found that there were no nationally significant harmful consequences that could be deduced from information on past flood events within the whole county. The analysis of surface water, using the EA's Flood Map for Surface Water (FMfSW), revealed that up to 4,883 properties could be at risk from the 1 in 200 AEP rainfall event. However, as these at risk properties were scattered over the district, there were no significant clusters therefore the scale of risk was not considered to be sufficient enough to consider the district as a Flood Risk Area at a European level. NYCC therefore was not required to produce a Flood Risk Management Plan for its area due to the absence of any designated Flood Risk Areas.

The PFRA process is cyclical and will need to be carried out again by 2017. The next round of PFRAs should be based on the more detailed third generation updated Flood Map for Surface Water (uFMfSW) from the EA.

#### 4.2.2 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.

#### 4.2.3 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 a series of plans called River Basin Management Plans (RBMP). The HBC area is covered by the Humber River 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 Humber RBMP, 2015, 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<sup>7</sup>.

The second management cycle of the WFD<sup>8</sup> has already begun and the second river basin management plans were completed in 2015, building upon the first set of RBMPs completed in 2009.

The main responsibility for HBC and NYCC 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 programme of actions (measures) within the RBMP highlights the need for:

- Water Cycle Studies to promote water efficiency in new development through regional strategies and local development frameworks,
- Surface Water Management Plan implementation,
- Considering the WFD objectives (achieving good status or potential as appropriate) in the spatial planning process, including LDDs and Sustainable Community Strategies, and
- Promoting the wide scale use of Sustainable Drainage Systems (SuDS) in new development.

### 4.3 Planning Policy

#### 4.3.1 National Planning Policy Framework

The NPPF was published in March 2012, and is based on core principles of sustainability. It forms the national policy framework in England and is accompanied by a number of Planning Practice Guidance notes. It must be taken into account in the preparation of Local Plans and is a material consideration in planning decisions. Section 10 Paragraph 100 of the NPPF states that Local Plans...

*“...should be supported by a Strategic Flood Risk Assessment and develop policies to manage flood risk from all sources, taking account of advice from the Environment Agency and other relevant flood risk management bodies, such as Lead Local Flood Authorities and Internal Drainage Boards. Local Plans should apply a sequential, risk-based approach to the location of development to avoid, where possible, flood risk to people and property and manage any*

<sup>7</sup> <https://www.gov.uk/government/policies/improving-water-quality/supporting-pages/planning-for-better-water>

<sup>8</sup> [http://ec.europa.eu/environment/water/water-framework/info/timetable\\_en.htm](http://ec.europa.eu/environment/water/water-framework/info/timetable_en.htm)

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

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 to locations at the lowest probability of flooding. It states that development should not be permitted or allocated if there are reasonably available sites appropriate for the proposed development in areas with a lower probability of flooding.

The Flood Risk and Coastal Change Planning Practice Guidance (FRCC-PPG) sits alongside the NPPF and sets out detailed guidance on how this policy should be implemented.

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

On 6 March 2014 the Department for Communities and Local Government (DCLG) launched their planning practice guidance, including guidance for flood risk and coastal change, which replaces the previous Technical Guidance. This new guidance is available as a web-based resource<sup>9</sup>, which is accessible to all and is regularly updated. 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.

#### 4.3.3 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.

#### 4.3.4 Local Plan

A Local Plan<sup>10</sup> 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 infrastructure as well as safeguarding the environment and adapting to climate change and securing good design.

<sup>9</sup> <http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/>

<sup>10</sup> Town and Country Planning, England. The Town and Country Planning (Local Planning) (England) Regulations 2012 2016s4478 HBC Level 1 SFRA Final Report v2.0.doc



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 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. The 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 the SFRA and Sustainability Appraisal.

#### 4.3.4.1 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.

The council has started working towards a new Local Plan for the district, scheduled for adoption by autumn 2018 and an updated SA will be produced in support of this. In September 2014 consultation was undertaken on the SA Scoping Report with Natural England, English Heritage, the EA and a number of other key organisations. The Draft SA Interim Report was produced in July 2015. This Interim Report started the process of developing and refining alternative growth options, assessing effects and refined the Assessment Rationale for Sites. The report also includes a summary of the comments received at the Scoping Report Stage.

#### 4.3.4.2 The Emerging Harrogate District Local Plan

The emerging Harrogate District Local Plan is scheduled for adoption by autumn 2018<sup>11</sup> and will look ahead to the year 2035. It will set out how much land and where such land should be provided for new homes and employment, alongside associated infrastructure. It will also include detailed development management policies and a policies map.

The Harrogate District Draft Local Plan contains Policy CC1: Flood Risk and Sustainable Drainage. Consultation on the Local Plan is scheduled to take place in the autumn of 2016. The Local Plan should be the starting point when considering planning applications.

### 4.4 Flood Risk Management Policy

#### 4.4.1 Harrogate Borough Council Level 2 SFRA (August 2013)

The 2013 Level 2 SFRA was commissioned by HBC following the completion of the 2010 North West Yorkshire Level 1 SFRA.

The 2013 Level 2 assessment, for HBC only, provided a more detailed assessment of four areas that were identified as at significant risk of flooding in the NW Yorkshire Level 1 SFRA, and where HBC was targeting for development / redevelopment in its Local Development Framework. These four areas included two sites in Ripon, two in Masham and one in Pateley Bridge.

Each site was assessed for flood risk and recommendations were made based on the outcomes of this assessment. An amended site at Pateley Bridge is included (P7) in HBC's latest potential sites list (the SHELAA). In addition, one of the Masham sites is still included (Site M11,

<sup>11</sup> The timescale for preparing the Local Plan is set out in the Local Development Scheme which is available on the Council's website

Westholme Road) and one of the Ripon sites is also included (Site R26, Auction Mart, Ripon). The following recommendations were made for the two sites which are still considered relevant in this 2016 Level 1 SFRA:

#### **Masham Site M11, Westholme Road**

- Development should be focussed to Flood Zone 1. Access routes which are safe during a flood event should be built into the development.
- Access to the site from Foxholme Lane and Westholme Road are modelled as flooding from Swinney Beck. Safe evacuation routes and emergency service access should be developed.
- The development of the site and consequent remodelling of ground levels (i.e. based on land raising) may result in the loss of floodplain storage. Requirements for alternative flood storage volumes will need to be discussed and agreed with the EA.
- Any FRA should investigate the condition of the Swinney Beck channel, with overgrown vegetation and channel blockages having been flagged as issues in past surveys.

#### **Ripon Site R26, Auction Mart**

- Development should be focussed to Flood Zone 1. Access routes which are safe during a flood event should be built into the development.
- Defra have produced a document titled 'Flood Risks to People – Phase 2 (FD2321/TR2)<sup>12</sup>. This uses the concepts of flood hazard in combination with area vulnerability and people vulnerability. It is recommended that this is investigated in some detail across the site and used to inform the layout and design of any development.
- The site is within an existing flood warning area and any new development should use this service to enable timely evacuation of the site in a flood event.
- The site benefits from EA defences, which reduce the depth and velocity of flooding. These defences should be maintained as part of the management of flood risk at the site.

#### **4.4.2 Flood Risk Management Plans**

Flood risk management plans (FRMPs) explain the risk of flooding from rivers, the sea, surface water, groundwater and reservoirs with each FRMP covering a specific river basin district. FRMPs set out how risk management authorities, including the EA and LLFAs, will work with communities to manage flood risk over the period 2015 - 2021. Each EU member country must produce FRMPs as set out in the EU Floods Directive 2007.

The Humber FRMP<sup>13</sup> is within the Humber River Basin District which covers approximately 26,000 square kilometres from the North York Moors in to Birmingham and from the Pennines to the North Sea. As explained in Section 4.2.1.1, NYCC was not required to produce a FRMP for its own area following the PFRA process whereby significant flood risk areas were not identified.

Developed by the EA, the Ouse Catchment Flood Management Plan (CFMP)<sup>14</sup> covers the Harrogate District. The CFMP contains useful information about how the Ouse catchment works, previous flooding and the sensitivity of the river system to increased rainfall. The EA may draw on the evidence and previous proposals set out in the CFMP to help develop the FRMP.

<sup>12</sup> <http://randd.defra.gov.uk/Default.aspx?Module=More&Location=None&ProjectID=12016>

<sup>13</sup>

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/507114/LIT\\_10204\\_HUMBER\\_FRMP\\_SUMMARY\\_DOCUMENT.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/507114/LIT_10204_HUMBER_FRMP_SUMMARY_DOCUMENT.pdf)

<sup>14</sup>

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/289228/River\\_Ouse\\_Catchment\\_Flood\\_Management\\_Plan.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/289228/River_Ouse_Catchment_Flood_Management_Plan.pdf)

#### 4.4.3 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 Act requires risk management authorities (local authorities, internal drainage boards, 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, business and infrastructure operators to deliver more effective flood risk management.

LLFAs have responsibility for developing a Local Flood Risk Management Strategy (LFRMS) for their area covering local sources of flooding (see Table 4-1). The local strategy produced must be consistent with the National Strategy. The 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.

NYCC, as the LLFA, developed a LFRMS<sup>15</sup> in partnership with the seven district councils of North Yorkshire (Harrogate, Selby, Hambleton, Ryedale, Richmondshire, Scarborough and Craven). The Strategy was adopted in February 2015.

##### 4.4.3.1 North Yorkshire County Council Local Flood Risk Management Strategy

The LFRMS sets out how NYCC, as LLFA, will manage flood risk from all types of flooding such as surface water runoff, groundwater and ordinary watercourses for which the County Council has a responsibility as LLFA, and other types of flooding where local agents can play a supporting role to lead agencies. HBC as an LPA within NYCC are required to work in partnership with the LLFA to manage flood risk.

The LFRMS has six key objectives:

- To provide a greater role for communities in managing flood risk
- To improve the knowledge and understanding of flood risk and management responsibilities within NYCC and amongst partners, stakeholders, communities and the media
- To encourage sustainable and appropriate development utilising sustainable drainage where ever possible
- To increase knowledge of watercourse network and drainage infrastructure
- To carry out flood risk management measures that deliver social, economic and environmental benefits
- To make the best use of all potential funding opportunities to deliver flood risk management measures.

The Strategy also sets out an action plan of how the LLFA intend to achieve these objectives. Proposed actions are divided into four categories; Prevention, Protection, Preparedness and Recovery & Review. Each category contains the following information:

- A description of the action required
- The timescale for implementation of the action
- The source of flooding that relates to the action
- The level of priority
- The organisation to lead the action and support organisations

15 <http://www.northyorks.gov.uk/article/29725/North-Yorkshire-local-flood-risk-strategy>  
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- The estimated cost of the action

#### 4.4.4 Surface Water Management Plans

In June 2007, widespread extreme flooding was experienced in the UK. The Government review of the 2007 flooding, chaired by Sir Michael Pitt recommended that...

*“...Local Surface Water Management Plans (SWMPs) ... coordinated by local authorities, should provide the basis for managing all local flood risk.”*

The Government's guidance document<sup>16</sup> 2011 for SWMPs defines a SWMP as:

- *A framework through which key local partners with responsibility for surface water and drainage in their area, work together to understand the causes of surface water flooding and agree the most cost-effective way of managing surface water flood risk.*
- *A tool to facilitate sustainable surface water management decisions that are evidence based, risk based, future proofed and inclusive of stakeholder views and preferences.*
- *A plan for the management of urban water quality through the removal of surface water from combined systems and the promotion of SuDS.*

As a demonstration of its commitment to SWMPs as a structured way forward in managing local flood risk, Defra announced an initiative to provide funding for the highest flood risk authorities to produce SWMPs. *No high risk locations were identified in Harrogate district as part of this process.*

#### 4.4.5 Flood Risk Partnerships and Partnership Plans

HBC has been involved in the development of a number of partnerships designed to provide collaboration between public agencies, businesses and the community. Partnerships and plans that affect the district include:

- North Yorkshire Local Resilience Forum (NYLRF)
- North Yorkshire County Council Emergency Planning Unit
- Community Emergency Plans (at the town / parish council level)
- North Yorkshire Flood Risk Partnership
- Community Risk Register
- 'Yorkshire Floods' (support & recovery group)
- Harrogate & Ripon Centres for Voluntary Service

See Section 7 on Emergency Planning for more information.

#### 4.4.6 Green Infrastructure Assessments

Open space, or Green Infrastructure, 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.

<sup>16</sup> Surface Water Management Plan Technical Guidance - <https://www.gov.uk/government/publications/surface-water-management-plan-technical-guidance>

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). 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 Sustainable Drainage Systems (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.

#### 4.4.6.1 Harrogate District Green Infrastructure Supplementary Planning Document, 2014

This Supplementary Planning Document (SPD) was adopted in 2014. The SPD aims to help applicants and developers to ensure that proposals for development across the district make the most of opportunities to improve existing open spaces and create new green infrastructure, where feasible. It provides detailed guidance on how policy is applied when it comes to conserving and enhancing the natural environment.

The document provides case studies of how good quality green infrastructure can be achieved in different development contexts as well as more detailed guidance on how good quality green infrastructure can be achieved within main urban areas and on large greenfield urban extensions.

The document refers to the guidance provided in the NPPF on green infrastructure, and also references the Core Strategy and Local Plan.

## 4.5 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.

### 4.5.1 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.

### 4.5.2 HBC 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;

### 4.5.3 NYCC 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.

#### 4.5.4 Yorkshire 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.

#### 4.5.5 Internal Drainage Board as a RMA

- Has responsibility for water level management in low lying areas;
- Can make byelaws to prevent flooding or remedy or mitigate damage caused by flooding;
- Must work in partnership with other authorities to actively manage and reduce the risk of flooding.

#### 4.5.6 Highways Authority (NYCC) 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.

#### 4.5.7 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.

#### 4.5.8 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'<sup>17</sup>.

#### 4.5.9 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.

Table 4-1 provides an overview of the key LLFA responsibilities under the FWMA.

Table 4-1: Key LLFA Duties under the FWMA

FWMA Responsibility	Description of duties and powers	NYCC LLFA Status
<b>Local Strategy for Flood Risk Management</b>	A 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.	Adopted Feb 2015 (see Section 4.4.3.1)
<b>Duty to contribute to sustainable development</b>	The LLFA has a duty to contribute towards the achievement of sustainable development.	Ongoing
<b>Duty to comply with national strategy</b>	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
<b>Investigating Flood Incidents</b>	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 risk management authorities.	Ongoing
<b>Asset Register</b>	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.	Under development
<b>Duty to co-operate and Powers to Request Information</b>	The LLFA must co-operate with other relevant authorities in the exercise of their flood and coastal erosion management functions.	Ongoing
<b>Ordinary Watercourse Consents</b>	A 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
<b>Works Powers</b>	The Act provides a LLFA with powers to undertake works to	Ongoing

FWMA Responsibility	Description of duties and powers	NYCC LLFA Status
	manage flood risk from surface runoff, groundwater and on ordinary watercourses, consistent with the local flood risk management strategy for the area.	
<b>Designation Powers</b>	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
<b>Emergency Planning</b>	A LLFA is required to play a lead role in emergency planning and recovery after a flood event.	North Yorkshire Local Resilience Forum (Section 7.1.1)
<b>Community Involvement</b>	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.	Various ongoing (Section 7.1.1)
<b>Planning Requirements for SuDS</b>	Sustainable Drainage Systems (SuDS) are to become 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 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.	Implemented April 2015
Latest changes to FWMA legislation <sup>18</sup>		

<sup>18</sup> <http://www.legislation.gov.uk/ukpga/2010/29>

## 5 Flood Risk within Harrogate District

### 5.1 Flood Risk Datasets

This section of the SFRA provides a strategic overview of flood risk from all sources within the district. The information contained is the best available at the time of publication and is intended to provide HBC with an overview of risk. Where further detail is available, then the source of information is provided. 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	EA Flood Map for Planning (Rivers and Sea) (February 2016 version)
	EA Risk of Flooding from Rivers and the Sea Map
	EA Flood Risk Mapping Studies
	Historic evidence – EA Historic Flood Map
	Ouse Catchment Flood Management Plan
Pluvial (surface water runoff)	EA updated Flood Map for Surface Water (uFMfSW)
	NYCC Preliminary Flood Risk Assessment
Sewer	Yorkshire Water DG5 Register
	Yorkshire Water Drainage Area Zones
Groundwater	EA Areas Susceptible to Groundwater Flooding (AStGWF)
Canal	Canal & River Trust Asset Database
Reservoir	EA Reservoir Flood Maps (available online)
All sources	North Yorkshire Local Flood Risk Management Strategy
	HBC Emergency Planning Unit flood incident register
	North Yorkshire Fire & Rescue Service historic flood incident data
	Humber River Basin Management Plan
	Humber Flood Risk Management Plan
	NW Yorkshire Level 1 SFRA 2010; Harrogate Level 2 SFRA 2013
Flood risk management infrastructure	EA flood defence data
	Canal & River Trust Asset Database

### 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.

Judging from the EA's Flood Map for Planning, the majority of fluvial flood risk comes from the River Nidd and River Ure and their tributaries. The areas include rural land in the Nidderdale Area of Outstanding Natural Beauty and the towns of Harrogate, Ripon, Knaresborough, Masham, Pateley Bridge and Boroughbridge.

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

#### 5.2.1 EA Flood Map for Planning

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), the 1 in 200 AEP tidal event (also Flood Zone 3) and the 1 in 1000 AEP fluvial and tidal 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 their flood zones with detailed hydraulic model outputs as part of their national flood risk mapping programme.

The EA 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 tidal, and do not take account of climate change. For this SFRA, Flood Zone 3 is subdivided into Flood Zone 3a, Flood Zone 3ai (see Section 5.2.3) and Flood Zone 3b, which includes areas of functional floodplain (see Section 5.2.2).

The EA also provides a 'Risk of Flooding from Rivers and the 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. This dataset is further discussed in Section 5.2.4.

This SFRA uses the EA's Flood Map for Planning version issued in February 2016 to assess fluvial and tidal risk to potential development sites, as per the NPPF and the accompanying Flood Risk and Coastal Change Planning Practice Guidance (see Section 6.5.1 for this assessment). 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 February 2016:

<http://apps.environment-agency.gov.uk/wiyby/37837.aspx>

## 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 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.

A technical note is provided in Appendix C which explains the methodology used in creating the functional floodplain outline. The outline is also displayed on the SFRA Maps in Appendix A.

As part of this SFRA, the Environment Agency provided all of its most recent, readily available hydraulic river model 20 or 25 year defended scenario modelled flood outlines for the district. Where a 1 in 20 year, defended scenario outline was available, this was used to help define the functional floodplain. Where a 1 in 20 year defended scenario outline had not been produced,

the 1 in 25 year defended scenario outline was used. Table 5-2 lists the outputs used from the relevant modelling study provided by the EA. The EA Historic Flood Map and Flood Storage Area datasets were also used to create the functional floodplain. 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 Flood Zone 3ai

The Flood Zone 3ai approach has been implemented by the council. Flood Zone 3ai is defined as developed land within Flood Zone 3b where water would flow or be stored in times of flooding. In NPPF terms this is part of Flood Zone 3a but following discussions with the EA it was agreed that Flood Zone 3a should be subdivided. Identification of zone 3ai allows the council to assess risk within 3a in more detail showing areas where existing development is likely to be restricting flood flows and water storage that would otherwise be within the functional floodplain. Should sites in Flood Zone 3ai become available for new or further development then both the risk at the sites and their role in managing flood risk in the surrounding area should be carefully considered in line with Local Plan policies. Flood Zone 3ai includes the areas of land that would be in Flood Zone 3b if not already developed and should therefore be used as an indicator of flood risk, from a modelled 1 in 20 / 25 year event, to existing developed sites.

Flood Zone 3ai has been defined using the same 1 in 20 and 1 in 25 AEP event outlines produced from flood risk mapping studies (see Table 5-2), and the Historic Flood Map, that were used to create the functional floodplain. The Flood Zone 3ai outline was assessed and agreed upon by the LPA, the LLFA and the EA, based on their local knowledge.

For any potential development sites within Flood Zone 3a that are located in an area where there is no Flood Zone 3ai or functional floodplain, a cautionary approach should be applied whereby 3a could be considered as Flood Zone 3ai or functional floodplain. Site-specific FRAs should therefore account for this through further detailed investigation and assessment of the actual risk and extent of any possible extensions to Flood Zone 3ai or functional floodplain.

Table 5-2: Flood mapping studies and outputs

Modelling study	Output
River Ure and Tributaries Modelling Study, 2010	25 year defended outline
Ripon Data Improvements, 2013	25 year defended outline
Bishop Monkton Model Update, 2014	20 year defended outline

### 5.2.4 EA Risk of Flooding from Rivers and the Sea Map

This map 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. The 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 Risk of Flooding from Rivers and the Sea Map (RFRSM) 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 the HBC SFRA, includes:

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

Judging from the updated Flood Map for Surface Water (uFMfSW), surface water flooding is prevalent, particularly in the eastern half of the district east of Galphay, Ripley and Pannal, where the terrain begins to flatten off and surface water can accumulate. The higher ground to the west of the district is much less at risk, outside of the main valleys.

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.

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 year 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 year event. There is also a residual risk associated with these networks due to possible network failures, blockages or collapses.

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 uFMfSW, 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.

#### 5.3.2 Updated Flood Map for Surface Water (uFMfSW)

The EA updated the second generation FMfSW in 2013 to produce a third generation national surface water flood map, the updated Flood Map for Surface Water (uFMfSW). The uFMfSW 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 National Modelling and Mapping Method Statement, May 2013 details the methodology applied. The uFMfSW is displayed on the SFRA Maps.

### 5.3.3 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.

Yorkshire Water is the water company responsible for the management of the majority of the district's drainage network.

### 5.3.4 Locally Agreed Surface Water Information

EA guidance on using surface water flood risk information recommends that the 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".*

For the purposes of the PFRA, NYCC used the Flood Map for Surface Water (FMfSW) dataset to define surface water flood information in the region. This dataset uses a more detailed digital terrain model than the first generation Areas Susceptible to Surface Water Flooding (AStSWF), therefore providing a more accurate representation of the terrain and overland flow routes. The FMfSW was the second generation of surface water map produced by the EA. NYCC and HBC should now consider the third generation updated Flood Map for Surface Water (uFMfSW) as their locally agreed surface water flood information as this is the latest, most robust surface water flood map available.

### 5.3.5 Critical Drainage Areas or Areas of Critical Drainage

The Town and Country Planning (Development Management Procedure) (England) Order 2010 defines a Critical Drainage Area (CDA) as:

*"...an area within Flood Zone 1 which has critical drainage problems and which has been notified to the local planning authority by the Environment Agency".*

EA guidance on carrying out Flood Risk Assessments<sup>19</sup> states that a FRA should be carried out for sites in Flood Zone 1 that are...

*"...in an area with critical drainage problems as notified by the Environment Agency."*

The EA has not formally designated any CDAs within the Harrogate District. The 2010 Level 1 SFRA proposed a number of CDAs based on clustering of Yorkshire Water historical surface water flood incidents and the Flood Map for Surface Water. The 2013 Level 2 SFRA however stated that NYCC, as the LLFA, were, at the time, investigating and prioritising areas of surface water flood risk which could lead to the development of CDAs in collaboration with the EA and Yorkshire Water. Investigation work is on-going and at present no CDAs have been identified within Harrogate District.

<sup>19</sup> <https://www.gov.uk/guidance/flood-risk-assessment-in-flood-zone-1-and-critical-drainage-areas>  
2016s4478 HBC Level 1 SFRA Final Report v2.0.doc

## 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.

The AStGWF is shown on the SFRA Maps.

## 5.5 Canal and Reservoir Flood Risk

### 5.5.1 Canals

There are two canalised watercourses within the district, namely the Ripon Canal and the Ure Navigation, see the SFRA Maps (Appendix A) to view the canal network. The canal network is owned and maintained by the Canal & River Trust, who have provided their asset database as part of this SFRA.

The risk of flooding along a canal is considered residual and is dependent on a number of factors. As canals are manmade systems that are heavily controlled, it is unlikely they will respond in the same way as a natural watercourse during a storm event. Flooding is more likely to be associated with residual risks, similar to those associated with river defences, such as overtopping of canal banks, breaching of embanked reaches or asset (gate) failure as highlighted in Table 5-3. Canals can also have a significant interaction with other sources, such as watercourses that feed them and minor watercourses or drains that cross underneath.

Table 5-3: Canal flooding mechanisms

Potential Mechanism	Significant Factors
Leakage causing erosion and rupture of canal lining leading to breach	Embankments Sidelong ground Culverts Aqueduct approaches
Collapse of structures carrying the canal above natural ground level	Aqueducts Large diameter culverts Structural deterioration or accidental damage
Overtopping of canal banks	Low freeboard Waste weirs
Blockage or collapse of conduits	Culverts

The risks associated with these events are also dependent on their potential failure location with the consequence of flooding higher where floodwater could cause the greatest harm due to the

presence of local highways and adjacent property. The focus should be on areas adjacent to raised embankments. The pound length of the canal also increases the consequence of failure, as flows will only cease due to the natural exhaustion of supply. Stop plank<sup>20</sup> (log) arrangements, stop gates and the continued inspection and maintenance of such assets by the Canal & River Trust help to manage the overall risk of a flood event.

### 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. LAs should work with other members of the North Yorkshire Local Resilience Forum to develop these plans. See Section 7.1.1 for information on the North Yorkshire Local Resilience Forum of which HBC and NYCC are a part of.

### 5.5.3 Reservoir Flood Maps

The EA has prepared reservoir flood maps for all large reservoirs that they regulated under the Reservoirs Act 1975 (reservoirs that hold over 25,000 cubic meters of water).

The maps show the largest area that might be flooded if a reservoir were to fail and release the water it holds but do not give any information about the depth or speed of the flood waters. HBC Emergency Planners should have access to this information so they can develop effective Emergency Plans. Due to the sensitivity of the information, any detailed information on reservoirs is not provided within this SFRA.

However, reservoir flood maps can be viewed online only and can be found on the EA's website<sup>21</sup>. The FWMA updated the Reservoirs Act and targeted a reduction in the capacity at which reservoirs should be regulated from 25,000m<sup>3</sup> to 10,000m<sup>3</sup>. 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.

## 5.6 Historical Flooding

The Emergency Planning Unit of HBC provided a table listing various flooding incidents that have occurred which required a response from the Emergency Planning Unit. There are no dates associated with these incidents however it provides an indicator of where significant flooding incidents have occurred in the past. This information is presented in Table 5-4 and relate to specific incidents within a part of the settlement. The NYCC LFRMS and PFRA also summarise historical flood events that have occurred across the county.

Table 5-4: Known areas that have required a response from the Emergency Planning Unit

Area	Type of Flooding	Remarks
<b>Birstwith</b>	Surface Water	Flooding from highway run off / saturated ground
<b>Bishop Monkton</b>	River Flooding	Flooding from Bishop Monkton Beck
<b>Boroughbridge</b>	River Flooding	Flooding from River Ure and River Tutt, overtopping of Canal and Surface water flooding from highway / local farmland

<sup>20</sup> Wooden boards for dropping into grooves at a narrows; to permit drainage for maintenance work on a canal section or to isolate a leaking section

<sup>21</sup> [http://maps.environment-agency.gov.uk/wiyby/wiybyController?x=357683.0&y=355134.0&scale=1&layerGroups=default&ep=map&textonly=off&lang=\\_e&to pic=reservoir](http://maps.environment-agency.gov.uk/wiyby/wiybyController?x=357683.0&y=355134.0&scale=1&layerGroups=default&ep=map&textonly=off&lang=_e&to pic=reservoir)

Area	Type of Flooding	Remarks
<b>Brearton</b>	Surface water / Beck Flooding	Flooding due to run off from saturated ground / highway and also local Becks
<b>Cattal</b>	River Flooding	Flooding from River Nidd
<b>Darley</b>	Surface Water	Flooding from highway run off / saturated ground
<b>Great Ouseburn / Little Ouseburn</b>	Surface water / Beck Flooding	Flooding from surface water and also localised becks.
<b>Grewlethorpe</b>	Surface Water	Surface water run-off from highway/saturated ground
<b>Hampsthwaite</b>	Surface Water	Surface water flooding / localised flooding from becks
<b>Harrogate</b>	Surface Water	Surface water flooding from highway, saturated ground and localised becks
<b>Hunsingore</b>	River Flooding / Surface Water	Flooding from River Nidd and localised surface water flooding from Highway / saturated ground
<b>Kirk Hammerton</b>	River Flooding	Flooding from River Nidd
<b>Knaresborough</b>	River Flooding /some surface water	Flooding from River Nidd, some localised surface water flooding from saturated ground / highway flooding
<b>Leathley</b>	River Flooding	Flooding from River Wharfe / localised becks
<b>Lower Dunsforth</b>	River flooding	Flooding from River Ure
<b>Masham</b>	River Flooding	Flooding from River Ure and Swinney Beck
<b>Pannal</b>	Surface Water	Surface water flooding from highway / saturated ground
<b>Pateley Bridge</b>	River flooding and surface	Flooding from River Nidd and run off from Greenhow Hill
<b>Ripon</b>	River Flooding	Flooding from Rivers Ure/Skell
<b>Risplith</b>	Surface water	Saturated ground and couple of wells that flood
<b>Roecliffe</b>	River flooding	Flooding from River Ure and Surface Water flooding
<b>Starbeck</b>	Surface Water	Surface water flooding from Highway
<b>Tockwith</b>	Surface Water	Flooding from saturated ground and run off from farmland / highway flooding
<b>Walshford</b>	River Flooding	Flooding from River Nidd
<b>Whixley</b>	Surface Water	Flooding from surface water, highway / saturated ground

### 5.6.1 North Yorkshire Fire and Rescue Service Flood Incident Data

North Yorkshire Fire and Rescue Service (NYFRS) provided a spatial dataset containing flooding incident locations that NYFRS has attended over a five year period (from 1 April 2011 – 31 March 2016). NYFRS do not plot the extents of any flooding or each and every property affected by flooding during spate conditions, the incident plot is centred on the flooding location. There are also many different types of flooding incidents included, such as leaks in homes, to rivers breaching and subsequent flooding of properties. It was therefore decided not to include this data on the SFRA Maps. Incidentally, there were 213 flood incidents attended to by NYFRS over the five year period, across the district of Harrogate.

### 5.6.2 Historic Surface Water Flooding

Yorkshire Water provided a copy of their existing DG5 Register which is used to record flood incidents at the individual property level attributable to water company controlled sewer networks, whether that be from foul and / or surface water sewers. Due to the sensitivity of this information, this data could not be mapped as part of this SFRA. The Register does however list a number of properties that have flooded in the past as a result of surface water / sewer system flooding.

### 5.6.3 EA Historic Flood Map

The Historic Flood Map (HFM) contains outlines of past fluvial, tidal and groundwater flooding though does not contain any information regarding flood source, return period or date of flood. These outlines can be viewed on the accompanying SFRA Maps in Appendix A.

The HFM outlines show that there has been, what appears to be, widespread fluvial flooding from Main River in the past, namely; the River Ure, River Nidd, River Swale and the River Wharfe. Most areas flooded however tend to be rural or agricultural land though built up settlements such as Ripon, Boroughbridge and Lower Dunsforth are shown to have been subject to significant flooding from the River Ure in the past. The River Nidd has also caused noteworthy flooding to Pateley Bridge though most built up areas do not appear to have been subject to significant fluvial flooding, judging by the HFM.

## 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 in the district. 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

The EA provided an ArcGIS shapefile of its flood defence dataset which shows that there is a large network of flood defence infrastructure throughout the district, the majority of which are owned and maintained by private owners though a number of other assets are managed by the EA, the local authority or relevant internal drainage board.

There are 16 purpose build concrete flood walls, 13 of which are maintained by the EA, located on the River Ure at Ripon and Boroughbridge; and the River Skell at Ripon. The defences at Ripon are designed to protect residential areas with standards of protection (SoP) for a 1 in 100 year flood event. The Boroughbridge defences also protect residential areas with SoPs ranging from 1 in 200 years to 1 in 1000 year flood events. There are also a number of manmade flood embankments protecting residential areas of Boroughbridge and Ripon from the River Ure, the majority of which are owned and maintained by the EA.

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 the existing flood defences, structures and watercourses.
- 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.
- Operation of Floodline Warnings Direct and 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.

### 5.7.2 NYCC Assets

NYCC and HBC will both own and maintain a number of assets throughout the Harrogate borough which may include culverts, bridge structures, gullies, weirs and trash screens. The

majority of these assets will lie along ordinary watercourses within smaller urban areas where watercourses may have been culverted or diverted, or within rural areas. All these assets can have flood risk management functions as well as an effect on flood risk if they become blocked or fail. In the majority of cases responsibility lies with the riparian/land owner.

As part of their FWMA duties as LLFA, NYCC 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. HBC as an RMA, has duties to pass on relevant information to the LLFA and will therefore need to be involved in collecting data for the asset register.

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.

At the time of writing NYCC are still developing their FRM asset database, therefore it has not been made available for this assessment. It is however available to view upon request.

### 5.7.3 Water Company Assets

The sewerage infrastructure within the district of Harrogate 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 property. Yorkshire Water is responsible for the management of the urban drainage system. This includes surface water and foul sewerage. There may however be some private surface water sewers in the district as only those connected to the public sewer network transferred to the water companies under the Private Sewer Transfer in 2011. Surface water sewers discharging to watercourses did not transfer and would therefore not be under the ownership of Yorkshire Water, 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 Future Flood Risk Management Work Programmes

Based on information provided by the EA, there are a number of ongoing and proposed flood risk management work programmes in the district. In the Flood and Coastal Erosion Risk Management (FCERM) Development Programme, proposed works include Boroughbridge Floodgates Maintenance (2016-2018) and Boroughbridge Pumping Station Refurbishment (2018-2021).



## 6 Development and Flood Risk

### 6.1 Introduction

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

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

Modelled climate change outputs are unavailable for this study therefore a cautious approach to assessing future risk to sites at risk has been adopted. It is often the case that modelled 1 in 1000 year AEP event outlines are similar to modelled climate change scenarios for the 1 in 100 year 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 the current functional floodplain could become Flood Zone 3a. 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 SFRA's 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.

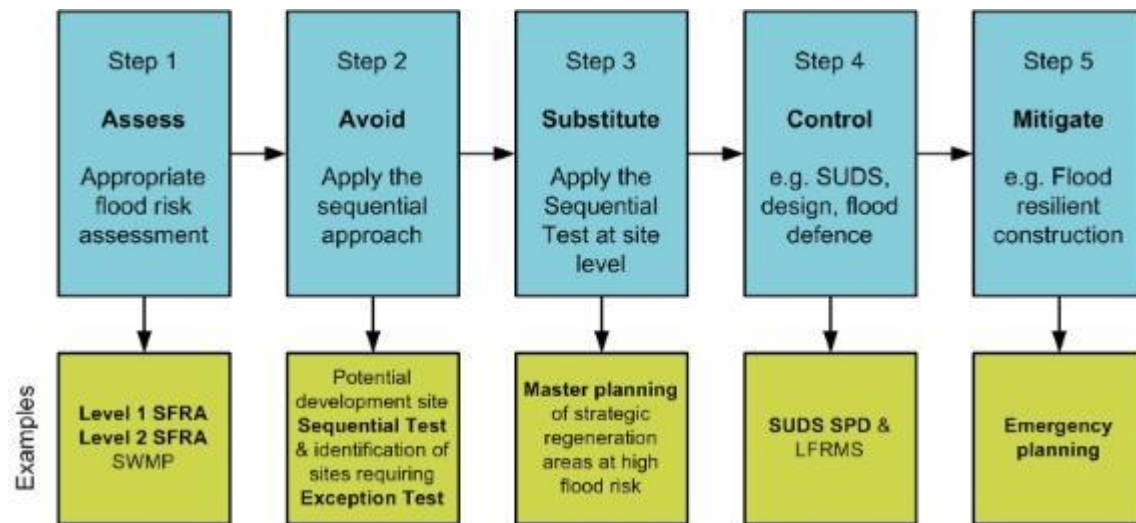
### 6.2 The Sequential Approach

The Flood Risk and Coastal Change Planning Practice Guidance (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, their property and the environment to acceptable levels.

The approach is based around the flood risk management 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 flood risk management opportunities identified.

Figure 6-1 illustrates the flood risk management (FRM) hierarchy with an example of how these may translate into the council's management decisions and actions.

Figure 6-1: Flood Risk Management hierarchy



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.

### 6.3 Local Plan Sequential & Exception Test

HBC, as 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.

(Guidance on the application of the Sequential and Exception tests through the development management process is provided at Section 6.7.1 of this report).

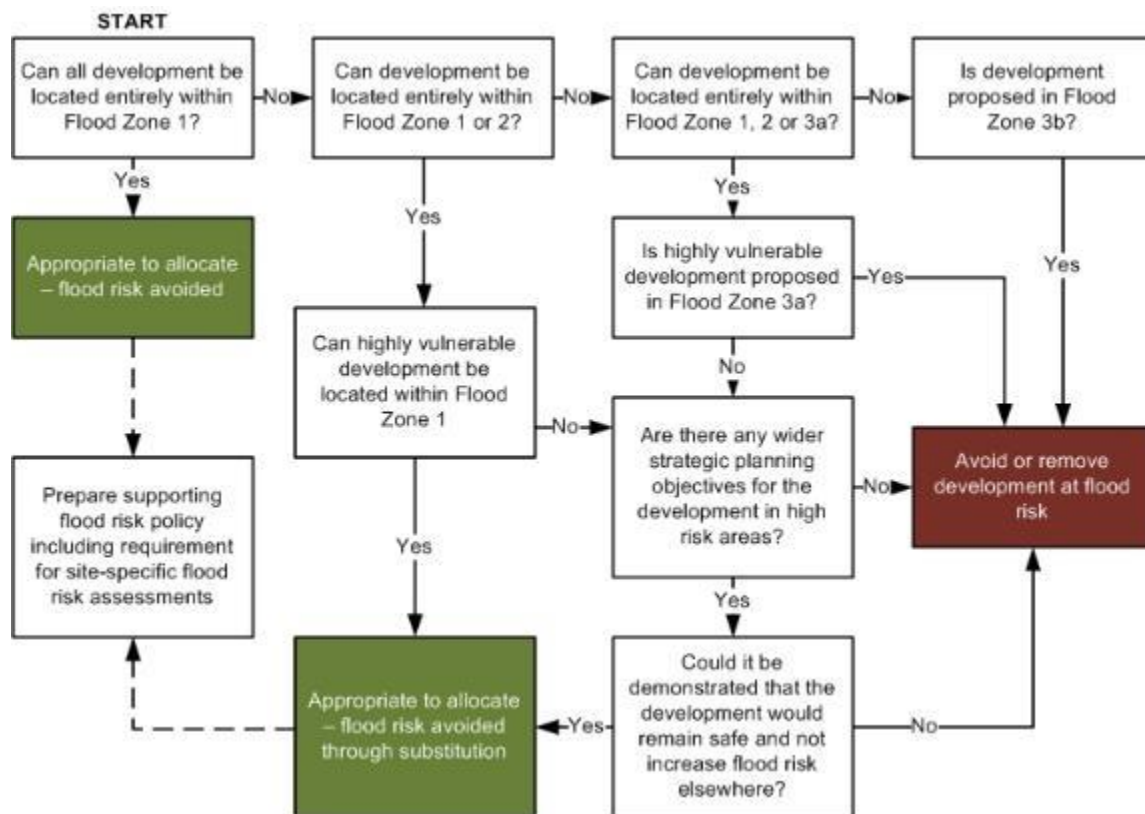
At a strategic level, this should be carried out as part of HBC's Local Plan. This should be done by:

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

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



This SFRA provides the main evidence required. This process also enables those sites that have passed the Sequential Test, and may require the Exception Test, to be identified.

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

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

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

Although actually passing the Exception Test will require the completion of a site-specific FRA, HBC 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?

Where it is 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 HBC should consider avoiding the site all together.

Once the process has been completed HBC should then be able to allocate appropriate development sites through the 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.

## 6.4 Local Plan Sites Assessment

### **Strategic Housing and Economic Land Availability Assessment (SHELAA)**

The SHELAA is an evidence base document that will inform the preparation of the council's Local Plan. LPAs have a requirement under the National Planning Policy Framework (NPPF) to demonstrate a sufficient supply of potential sites suitable for residential development to meet local housing requirements as well as sites for economic development uses.

Sites have been identified from a broad range of sources as suggested in PPG, and include planning commitments, sites promoted through a "call for sites" exercise (carried out in 2014), and sites included in the council's SHELAA. The council also conducted a further "call for sites" exercise as part of the Local Plan Issues and Options consultation in July 2015. The sites are assessed on their suitability for development, availability and the likelihood of development being financially viable. The assessment is used to inform the Local Plan, but it does not make policy decisions on future site allocations. The inclusion of a site in the assessment does not mean it will be developed, or that the LPA would view an application on the site favourably.

The identified sites have been considered by this SFRA update. 449 potential sites overall have been assessed and subdivided into several proposed uses including:

- Residential (392 sites)
- Employment (18 sites)
- Mixed use (38 sites), including housing, employment, retail, greenspace and gypsy and traveller
- Gypsy and traveller (1 site)

In order to inform the first part of the Sequential Approach for allocation of development through the Local Plan (illustrated in Figure 6-2), this SFRA has carried out a high level GIS screening exercise which involved overlaying the potential sites against Flood Zones 1, 2, 3a, 3ai and 3b.

Surface water risk to sites has also been assessed through the EA's updated Flood Map for Surface Water dataset to help identify those sites that may have critical drainage problems. The Development Site Assessment Excel spreadsheet, included in Appendix B, provides a breakdown of each site and the area (ha) and percentage coverage of each flood zone and each surface water flood zone.

Zones 3b, 3ai, 3a and 2 are considered in isolation. Any area of a site within the higher risk Flood Zones 3b or 3ai 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 the sequential assessment of risk at each site by addressing those sites at higher risk first. Table 6-1 provides a count of the number of sites within each Flood Zone.

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

Potential Development Site	Number of sites within...				
	Flood Zone 1*	Flood Zone 2	Flood Zone 3a	Flood Zone 3ai	Flood Zone 3b
Residential	329	57	48	13	20
Employment	16	2	2	0	1
Mixed use	21	15	14	6	9
Gypsy & traveller	1	0	0	0	0
<b>TOTAL</b>	<b>367</b>	<b>74</b>	<b>64</b>	<b>19</b>	<b>30</b>
*Sites with 100% area within Flood Zone 1					

HBC should use the Development Site Assessment spreadsheet in Appendix B to identify which sites should be avoided during the Sequential Test. If this is not the case, or where wider strategic objectives require regeneration in areas already at risk of flooding, then HBC 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.

#### 6.4.1 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 6.5.1.1, 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 6.5.1.3), 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 6.8).

Once the Council 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 to develop in Flood Zone 3, detailed modelling would be required to ascertain where water displaced by 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.

#### 6.4.2 Safeguarded Land for Flood Storage

Where possible, the Council 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 risk from 1 in 30 or 1 in 100 AEP surface water flood events (based on the uFMfSW),
- 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.

Potential sites covering existing greenfield land that could be safeguarded for flood storage are listed in Table 6-2. Note that parts of these sites may still be available for development, depending on the percentage area at risk and local conditions. 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.

Table 6-2: Potential areas to safeguard for flood storage

Site ID	Location	Area (ha)	Main source of risk	% area at risk
K5	Riverside Farm, Thistle Hill, Knaresborough	6.3	FZ3b	9.3 (FZ3b)
FF7	Land at Duck's Nest Farm, Follifoot	12.1	FZ3a	16.5 (FZ3a)
FF5	Land at Spofforth Lane, Follifoot	1.8	uFMfSW 30 year	9.4 (uFMfSW 30 year)
FF1	Land north of Spofforth Lane, Follifoot	0.8	uFMfSW 30 year	8.1 (uFMfSW 30 year)
H43	Land at Forest Moor Road, Harrogate	1.1	uFMfSW 30 year	6.4 (uFMfSW 30 year)
WE3	Land adjacent to the railway line, Weeton	2.6	uFMfSW 100 year	6.0 (uFMfSW 100 year)



## 6.5 Potential Development Sites Review

This section of the report assesses flood risk to potential sites. Section 6.5.1 provides high level broad-brush recommendations for those sites within the flood zones of the Flood Map for Planning. Section 6.5.2 reviews the surface water risk to the potential sites by way of the updated Flood Map for Surface Water.

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

## 6.5.1 Flood Map for Planning Site Assessment

The following recommendations provide only a guide, based on the flood risk information made available for this Level 1 SFRA. Information regarding local, site specific information is beyond the scope of this SFRA. It is HBC'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. These sections should be read alongside the Development Site Assessment spreadsheet in Appendix B.

### 6.5.1.1 Recommendation A – Consider withdrawal of site

This recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a Flood Zone.

Recommendation A applies to any site within the functional floodplain 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; retail; recreation and leisure; and mineral and waste are in the less vulnerable category, though waste management sites for hazardous materials fall with the more vulnerable category. Gypsy and traveller sites fall within the highly vulnerable category. Mixed use sites should be placed into the higher of the relevant classes of flood risk sensitivity. Development should not be permitted for sites within the more vulnerable and 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.

The 10% threshold is not included within any policy, it is merely considered that it would likely 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 included with Recommendation A upon more detailed investigation. It may also be possible to deliver part of some of the larger sites, dependent upon further investigation, where a significant area is not within Flood Zone 3b.

Table 6-3 lists those sites where Recommendation A should apply based on the 10% threshold of site area within the functional floodplain. This accounts for 8 sites.

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

Site ID	Site Name	Proposed use	Site Area (ha)	% Area within FZ3b
BW8	Land adjoining Kerry Ingredients (UK) Ltd to the south east, Birstwith	Mixed Use	2.0	11.9
H12	Land at Hornbeam Park, Harrogate	Residential	15.7	20.4
H13	Land at Nitter Hill, Harrogate	Residential	2.5	27.5
H8	Land off Leeds Road, Harrogate	Residential	10.2	30.1
LD2	Radmoor, Lower Dunsforth	Mixed Use	5.2	27.1
LL1	Low Laithe Trout Farm, Low Laithe	Mixed Use	2.0	55.0
R19	Land to the east of bypass, Ripon	Mixed Use	33.7	65.3
R21	Land at Rotary Way, Ripon	Mixed Use	2.0	32.8

### 6.5.1.2 Recommendation B – Exception Test

Recommendation B applies to sites where it is likely the Exception Test would be required. This does not include any recommendation on the likelihood of a site passing the Exception Test. These sites may need to be examined as part of a more in-depth Level 2 SFRA. The developer / LPA should attempt to avoid the risk area where possible.

This recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a Flood Zone.

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

- 10% or greater of any residential site or essential infrastructure site that is within Flood Zone 3a. Water-compatible and less vulnerable uses of land do not require the Exception Test if in Flood Zone 3a.
- 10% or greater of any mixed use site that may entail residential use that is within Flood Zone 3a.

All development proposals in Flood Zone 3a and Flood Zone 3ai 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.

It should be considered that, based on climate change, the 1 in 20 and 1 in 25 year flood event outlines used to create the functional floodplain, may increase in extent in 100 years' time meaning a larger number of sites or a larger percentage area of these sites may be at risk from the 1 in 20 / 25 year flood events. Table 6-4 lists those sites where Recommendation B should apply based on the 10% threshold of site area within Flood Zone 3a. The Development Site Assessment spreadsheet in Appendix B lists those sites where Recommendation B should apply, encompassing 15 sites. Five of these sites also have <10% area within Flood Zone 3b (see Appendix B).

Table 6-4: Sites where application of the Exception Test would be required

Site ID	Site Name	Proposed use	Site Area (ha)	% Area within FZ3a
B8	Land at Skelton Lane, Langthorpe	Residential	2.1	14.4
BW2	Land adjacent to River Nidd, Birstwith	Residential	4.3	37.3
DB4	Nidd Valley Saw Mills, Dacre Banks	Residential	1.4	12.8
H66	Rudfarlington Farm, Harrogate	Residential	119.5	15.1
LD1	Greenfield Farm, Lower Dunsforth	Residential	0.4	100.0
LL2	Benson Field, Low Laithe	Residential	0.7	10.9
M11	Land at Westholme Road, Masham	Residential	2.7	17.1
M12	Land at Fearby Road, Masham	Residential	2.7	88.1
M3	Land to the south of Swinton Road, Masham	Residential	2.1	38.0
OC5	New Settlement at Deighton Grange Farm, near Kirk Deighton	Residential	111.4	11.6
PN14	Land to the east and west of Leeds Road (smaller site), Pannal	Residential	18.3	14.0
SB4	Land at New York Mill, Summerbridge	Residential	3.3	73.9
TW1	Land to the south of Marston Road, Tockwith	Residential	3.1	11.4
TW6	Land south of Marston Road, Tockwith	Residential	3.6	21.7
WR1	Newlay Concrete, Wath near Ripon	Residential	1.0	14.2

### 6.5.1.3 Recommendation C – Consider site layout and design

This recommends a review of site layout and / or design at the development planning stage in order for development to proceed. A Level 2 SFRA may be required or a site-specific FRA would be required to inform on site layout and design.

This recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a Flood Zone.

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 site is within Flood Zone 3a.
- <10% of any mixed use site that may entail residential use is within Flood Zone 3a.
- <10% of any essential infrastructure 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.

The Development Site Assessment spreadsheet in Appendix B categorises those sites with <10% of their area within Flood Zone 3b where site layout should be examined with a view to removing the site footprint from Flood Zone 3b. 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.

Also listed within the spreadsheet are the residential and mixed use sites with <10% of their area within Flood Zone 3a and where site layout and / or design should be examined with a view to removing the site footprint from Flood Zone 3a or incorporating on-site storage of water into site design. Depending on local circumstances, if it is not possible to adjust the site boundary to remove the site footprint from Flood Zone 3a to a lower risk zone or to incorporate on-site storage of water within the site design, then the Exception Test should be undertaken and passed as part of a site-specific FRA.

Overall there are 36 potential sites to which Recommendation C applies, listed in Table 6-5.

As discussed in Section 6.1, a precautionary approach to accounting for climate change should be considered by assuming that Flood Zone 2 will become Flood Zone 3a in 100 years' time and Flood Zone 3a could become Flood Zone 3b, though depending on local circumstances.

Any site layout and design 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 suitable SuDS.

Table 6-5: Sites to consider layout and design to avoid risk areas

Site ID	Site Name	Proposed use	Site Area (ha)
B15	Land north of Milby Cut, Boroughbridge	Residential	5.5
B3	Land at Rocliffe Lane, Boroughbridge	Residential	3.7
BK2	Land and buildings at Low House Farm, Beckwithshaw	Residential	20.8
BW3	Land to the north of Wreaks Road, Birstwith	Residential	3.0
CA3	Land part of The Aubert, Cattal	Residential	1.3
CA4	New settlement, Cattal	Residential	80.8
DB2	Land at Dacre Banks	Residential	1.1
FF7	Land at Duck's Nest Farm, Follifoot	Employment	12.1
FX1	New settlement at south of A59 and west of Junction 47 (A1M), Flaxby	Mixed Use	183.4
FX3	New settlement to the north of the A59, Flaxby	Mixed Use	112.6
H2	Land north of Knox Lane, Harrogate	Residential	3.2
H35	Land at Knox Mill Lane, Harrogate	Residential	1.1
H39	Land off Forest Lane, Harrogate	Residential	12.2
H58	Land at Bilton Hall, Harrogate	Mixed Use	20.5
H67	Oak View Farm, Harrogate	Residential	14.6
HM3	Land at Hollins Farm, Hampsthwaite	Residential	3.1
K25	Land at Highfield Farm, Knaresborough	Residential	24.4
K5	Riverside Farm, Thistle Hill, Knaresborough	Mixed Use	6.3
M10	Land at Foxholme Lane, Masham	Residential	3.5
M9	Land to the east of Marfield House, Masham	Residential	1.6
MK8	Land to the south of High Mill Farm, Markington	Residential	1.7
OC2	Rudding Farm, near Kirk Deighton	Mixed Use	28.7
OC4	Land north of Racecourse Approach, near Wetherby	Mixed Use	17.9
P6	Land opposite Nidderdale High School, Pateley Bridge	Residential	2.4
P7	Former Highways Depot, Pateley Bridge	Residential	0.6
PN13	Land to the east and west of Leeds Road (larger site), Pannal	Mixed Use	82.2
R13	Land at Snow Close Farm, Ripon	Residential	26.1
R20	Land adjacent to The Beeches, Ripon	Mixed Use	4.1
R27	Laver Banks, Clothierholme Road, Ripon	Residential	8.5
R28	Land at Little Studley Road, Ripon	Residential	0.7

Site ID	Site Name	Proposed use	Site Area (ha)
R3	Land to the rear of Kilburn, Littlethorpe Road, Ripon	Residential	1.3
SB1	Clough House Farm, Summerbridge	Residential	3.4
SB6	New York Mill, Summerbridge	Mixed Use	0.6
SP1	The Old Railway Cutting, Spofforth	Mixed Use	1.5
SP5	Land at Massey Garth, Spofforth	Residential	5.0
SP6	Land at Massey Fold, Spofforth	Residential	4.3

#### 6.5.1.4 Recommendation D – Development could be allocated subject to FRA

This recommends that development could be allocated, 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.

This recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a Flood Zone.

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

- Any site within Flood Zone 2 that does not have any part of its footprint within Flood Zone 3a, with the exception of highly vulnerable developments (such as gypsy and traveller sites) which would be subject to, and have to pass, the Exception Test.
- Employment, retail, recreation and leisure 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 within Flood Zone 3ai that does not fall under the constraints of recommendations A, B or C. Risk at such sites should be carefully considered through a FRA in line with Local Plan policies.
- Any site 100% within Flood Zone 1 where surface water flood risk is considered to be significant enough so as to require investigation through a site-specific FRA. Surface water risk to sites is assessed in Section 6.5.3.
- Any site 100% within Flood Zone 1 that is greater than or equal to 1 hectare in area.

Recommendation D applies to 257 potential sites overall, two of which are partially within Flood Zone 3ai and Flood Zone 1 (sites R15 and R29).

As discussed previously for other recommendations, a precautionary approach to accounting for climate change should be considered by assuming that Flood Zone 2 will become Flood Zone 3a in 100 years' time.

All development proposals within Flood Zone 2 or Flood Zone 3a must be accompanied by a site-specific Flood Risk Assessment. Any sites 100% within Flood Zone 1 that are equal to or greater than 1 hectare in area must be accompanied by a site-specific Flood Risk Assessment to determine vulnerability to flooding from other sources as well as fluvial and tidal. 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.

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).*



### 6.5.1.5 Recommendation E - Should be allocated on flood risk grounds subject to consultation with the LPA / LLFA

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 112 sites which equates to around a quarter of the sites (25%) assessed.

As discussed previously for other recommendations, a precautionary approach to accounting for climate change should be considered. For these 112 sites, 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.

Recommendation E applies to any site with its area 100% within Flood Zone 1 and with either no risk or minimal risk from surface water, based on the updated Flood Map for Surface Water.

### 6.5.2 Potential Sites within Flood Zone 3ai

19 potential development sites are at risk from Flood Zone 3ai. As discussed in Section 5.2.3, should sites in Flood Zone 3ai become available for new or further development (e.g. as brownfield sites) then both the risk at the sites and their role in managing flood risk in the surrounding area should be carefully considered in line with Local Plan policies. Three of the sites within Flood Zone 3ai have >10% of their area within Flood Zone 3b and are therefore included within Recommendation A. Table 6-6 lists the sites within Flood Zone 3ai, excluding those with >10% area within Flood Zone 3b.

Table 6-6: Sites within Flood Zone 3ai

Site ID	Site Name	Proposed use	Site Area (ha)	% Area within FZ3ai
B15	Land north of Milby Cut, Boroughbridge	Residential	5.5	2.0
B3	Land at Roecliffe Lane, Boroughbridge	Residential	3.7	3.4
B8	Land at Skelton Lane, Langthorpe	Residential	2.1	42.5
BM1	Land adjacent to Hall Farm, Bishop Monkton	Residential	1.9	24.1
BM5	Land adjacent to Long Meadow, Bishop Monkton	Residential	2.7	17.1
BW2	Land adjacent to River Nidd, Birstwith	Residential	4.3	6.2
DB4	Nidd Valley Saw Mills, Dacre Banks	Residential	1.4	22.6
HM6	Land southeast of St Thomas a Beckett Walk, Hampsthwaite	Residential	2.3	7.8
PN13	Land to the east and west of Leeds Road (larger site), Pannal	Mixed Use	82.2	0.0
PN14	Land to the east and west of Leeds Road (smaller site), Pannal	Residential	18.3	0.0
R15	Land adjacent to Kirkby Road, Ripon	Mixed Use	3.9	19.2
R26	Auction Mart, Ripon	Residential	2.6	0.7
R29	Ash Grove Industrial Estate, Ripon	Mixed Use	1.5	5.2
SB4	Land at New York Mill, Summerbridge	Residential	3.3	1.9
SP5	Land at Massey Garth, Spofforth	Residential	5.0	0.2
SP6	Land at Massey Fold, Spofforth	Residential	4.3	0.2

### 6.5.3 Surface Water Risk to Potential Sites

This section assesses surface water risk to each site according to the uFMfSW. The Development Site Assessment spreadsheet in Appendix B isolates each of the surface water outlines so that any area of a site within the higher risk 1 in 30 year outline is excluded from the medium risk 1 in 100 year outline and any area within the 1 in 100 year outline is excluded from the lower risk 1 in 1000 year outline. This allows a sequential assessment of risk at each site.

Table 6-7 shows the number of sites at risk for each event. A number of these sites are also at fluvial and / or tidal flood risk.

**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 updated Flood Map for Surface Water.**

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

uFMfSW event outline	Number of sites at risk	Number of sites with ≥10% / ≥20% area at risk
1 in 30 year	231	18
1 in 100 year	273	13
1 in 1000 year	357	27 <sup>^</sup>
In reality, sites within the 1 in 30 year outline will also be in the 1 in 100 year outline and those within the 1 in 100 year outline will also be in the 1000 year outline.		
<sup>^</sup> Based on 20% percentage threshold		

Table 6-7 summarises the number of sites at risk from each surface water flood zone. Of the 231 sites at risk from the higher risk 1 in 30 year event, 8% have 10% or more of their site area at risk. Only 5% of sites have 10% or more of their area at risk from the medium risk 1 in 100 year event and for the lower risk 1 in 1000 year extreme event, 8% of sites have 20% or more of their area at risk.

As explained with the fluvial / tidal 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 1 in 30 or 1 in 100 year event outlines, or 20% or greater for the 1 in 1000 year event, then it could prove difficult to manage this surface water on-site. Therefore, a site-specific FRA should be carried out to investigate possible mitigation measures for flood storage or infiltration techniques through appropriate SuDS. The percentage thresholds do not consider local conditions. Table 6-8 lists the sites where surface water flood risk is considered to be significant enough that it may be difficult to develop these sites.

Table 6-8: Sites requiring further investigation based on surface water risk

Site ID	Proposed use	Site Area (ha)	% Area within 1 in 30 Year Outline (uFMfSW)	% Area within 1 in 100 Year Outline (uFMfSW)
BL7	Residential	0.9	2.7	13.6
BM1	Residential	1.9	22.5	2.0
BM5	Residential	2.7	17.4	4.4
FR6	Residential	0.7	1.2	11.3
GO2	Residential	3.6	19.9	9.7
H15	Residential	1.6	16.9	1.3
H60	Employment	1.7	20.0	6.7
H63	Mixed Use	0.8	3.0	22.0
HM6	Residential	2.3	19.7	14.9
K15	Residential	1.8	15.6	9.9

Site ID	Proposed use	Site Area (ha)	% Area within 1 in 30 Year Outline (uFMfSW)	% Area within 1 in 100 Year Outline (uFMfSW)
K24	Residential	7.6	13.1	11.5
KH13	Residential	0.6	0.0	15.6
M1	Residential	2.6	34.7	14.6
M2	Residential	3.1	10.8	11.6
MK1	Residential	0.5	20.9	4.5
MS6	Residential	0.6	72.9	23.6
NS1	Residential	4.5	8.1	11.1
NS6	Residential	2.9	9.4	15.0
PN1	Residential	0.6	14.6	6.8
R14	Residential	0.3	15.1	7.8
SS1	Residential	1.1	16.0	12.0

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

- Possible withdrawal, redesign or relocation of the site, certainly for those sites at higher risk from the 1 in 30 year event and those with a large percentage area at risk. This applies to the sites listed in Table 6-8 where further investigation is recommended;
- A detailed site-specific Flood Risk Assessment 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, 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;
- Larger sites could leave surface water flood prone areas as open greenspace, incorporating social and environmental benefits;
- Effective surface water management should ensure risks on and off site are controlled;
- SuDS should be used where possible. Appropriate SuDS may offer opportunities to control runoff to Greenfield rates. Developers should refer to the NYCC SuDS Design Guidance<sup>22</sup>. 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;
- Whether the delineation of areas of critical drainage may be appropriate for areas particularly prone to surface water flooding. Detailed analysis and consultation with the LLFA, Yorkshire Water, the relevant Internal Drainage Board and the EA would be required. It may then be beneficial to carry out a Surface Water Management Plan (SWMP) or drainage strategy for targeted locations with any such areas of critical drainage. 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.

## 6.6 Summary of Assessment Options

### 6.6.1 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 residential (including gypsy and traveller) or employment site, or mixed use schemes with an element of residential development, as this falls into the more vulnerable, less vulnerable or highly vulnerable categories within Flood Zone 3b for which development should not be permitted. The Flood Risk and Coastal Change 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. If the developer is able to avoid 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.

### 6.6.2 Exception Test required

For 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.

### 6.6.3 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 within Flood Zone 3a. 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. Developers should refer to NYCC's SuDS Design Guide section 1 which provides details when and where SuDS are required:

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.

If a site is located within Flood Zone 3ai then any redevelopment of the site should have regard to restrictions set out in policies of the Local Plan. Where possible, such sites should look to reduce risk when designing for new development.

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, as per the NYCC SuDS Design Guide.

### 6.6.4 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 20 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 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.

The FRCC-PPG doesn't contain any further detail on the minimum requirements for site-specific FRAs. It is therefore important that the EA's FRA guidance<sup>23</sup> is referred to and also the site-specific Flood Risk Assessment Checklist in paragraph 068 of the FRCC-PPG should be consulted. CIRIA's report 'C624 Development and Flood Risk' also provides useful guidance.

***When is a Site-Specific FRA Required?***

According to NPPF footnote 20, a site-specific FRA should be prepared when the application site is:

- Situated in Flood Zone 2 and 3; for all proposals for new development (including minor development and change of use)
- 1 hectare or greater in size and located in Flood Zone 1
- Located in Flood Zone 1 where there are critical drainage problems
- 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

#### 6.6.5 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 allocations is likely to be acceptable from a flood risk point of view. For such sites, opportunities for flood storage should be explored however as part of an FRA.

All development proposals within flood zones 2 or 3 must be accompanied by a Flood Risk Assessment. Any sites 100% within Flood Zone 1 that are 1 hectare or more in area must be accompanied by a Flood Risk Assessment to determine vulnerability to flooding from other sources as well as fluvial. 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.

The Flood Risk and Coastal Change 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).*



## 6.7 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.

*The aim of this section is to provide guidance for developers on using this SFRA.*

*When initially considering the development options for a site, developers should use this SFRA, the NPPF and the Planning Practice Guidance 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**
  - *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 Development Control, 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 6.6.4 of this SFRA;*
  - *Also refer to the EA Standing Advice, CIRIA Report C624, NYCC SuDS Design Guidance, the NPPF and the Planning Practice Guidance;*
  - *Consult LLFA.*
- **Submit FRA to Development Control 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?
<b>Allocated Sites</b>	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
<b>Windfall Sites</b>	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
<b>Regeneration Sites Identified Within Local Plan</b>	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
<b>Redevelopment of Existing Single Properties</b>	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
<b>Changes of Use</b>	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

### 6.7.1 Development Management Sequential & Exception Test

This section of the SFRA has been developed to provide a useful tool to inform the development management process regarding the potential risk of flooding associated with future planning applications and the basis for requiring site-specific FRAs.

According to the NPPF Paragraph 103:

*“When determining planning applications, local planning authorities should ensure flood risk is not increased elsewhere and only consider development appropriate in areas at risk of flooding where, informed by a site-specific flood risk assessment following the Sequential Test, and if required the Exception Test, it can be demonstrated that:*

- *Within the site, the most vulnerable development is located in areas of lowest flood risk unless there are overriding reasons to prefer a different location; and*
- *Development is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed, including by emergency planning; and it gives priority to the use of sustainable drainage systems.”*

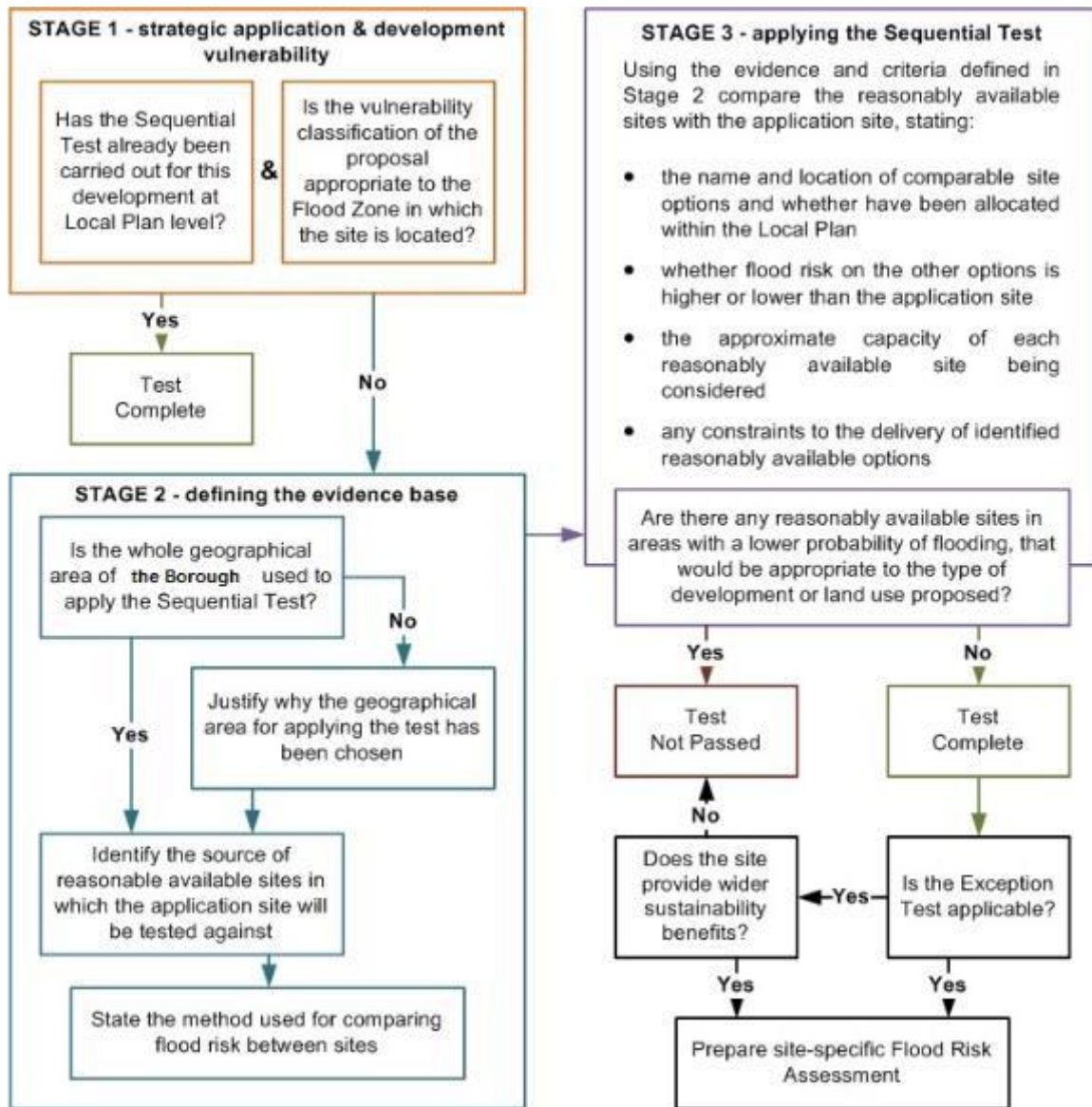
#### 6.7.1.1 Demonstrating the Sequential Test for Planning Applications

The EA provides advice via:

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

This advice recommends the approach illustrated by Figure 6-3 is used by LPAs to apply the Sequential Test to planning applications located in flood zones 2 or 3.

Figure 6-3: Development management Sequential Test process



The approach 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 Lead Local Flood Authority should be taken into account.

In accordance with the EA's advice, the following process should be followed:

- First, check the Local Plan for sites that have already been allocated for development and could be suitable for the development you are proposing,
- Also look at sites that have not been allocated in the Local Plan, but that have been granted planning permission for a development that is the same or similar to the development you are proposing,
- Finally, check whether there are any 'windfall sites' in your search area. Windfall sites are sites that are not allocated in the Local Plan and do not have planning permission, but could be available for development. You can look for windfall sites yourself and also reference the Council's SHELAA.

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. For HBC, this would be defined by the local circumstances relating to the catchment and for the type of development being proposed;**
- **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 6.6.4.

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.

### 6.7.2 Taking Climate Change into Account

Climate change will increase flood risk over the lifetime of a development. This SFRA has considered a precautionary approach to climate change, as discussed in Section 6.1. A more detailed assessment of the impacts of climate change on flooding from the land and rivers should be carried out as part of a 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 and river flow.

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 +30 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).

The EA revised the climate change allowances, in February 2016, for use in FRAs and SFRA 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). Table 6-10 shows the peak river flow allowances for the Humber River Basin District.

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

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

The peak rainfall intensity allowance applies to the whole of England. SFRA and FRAs should assess both the central and upper end allowances to gauge the range of impacts. Table 6-11 shows these allowances.

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%

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*<sup>24</sup>, 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 are presented in Table 6-12.

Table 6-12: UKCP09 High++ Allowances for Peak River Flow for the Humber River Basin District

River Basin District	Total Potential Change Anticipated for...		
	2020s (2015-39)	2050s (2040-69)	2080s (2070-2115)
Humber	+20%	+35%	+65%

**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.**

## 6.8 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.

As previously noted, NYCC as the LLFA has produced a SuDS Design Guidance document (see Section 6.8.1) for developers which should be referred to alongside this SFRA. HBC has also produced a drainage flowchart to guide to assist developers with their planning applications, in terms of drainage considerations. See Section 6.8.2 for information on this and Appendix D for the flowchart.

The FWMA, 2010, originally transferred the adoption and maintenance of SuDS to Sustainable Drainage Systems Approval Bodies (SABs) that were supposed to be established by local authorities, or LLFA's, under Schedule 3 of the Act. However, the designation of a SAB has since been removed following lengthy consultation, with the announcement from the Department for Communities and Local Government (DCLG) in December 2014 that local planners will be responsible for delivering SuDS<sup>25</sup>. Changes to planning legislation give 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<sup>26</sup>, published in March 2015. This builds on the existing planning system, the NPPF, which developers and local authorities are already using. Policy changes to the planning system can also be introduced relatively quickly ensuring that flood risk benefits from sustainable drainage systems can be brought forward as part of planning application proposals.

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

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

<sup>25</sup> <http://www.parliament.uk/business/publications/written-questions-answers-statements/written-statement/Commons/2014-12-18/HCWS161/>

<sup>26</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/415773/sustainable-drainage-technical-standards.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/415773/sustainable-drainage-technical-standards.pdf)

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, IDB and Yorkshire Water.

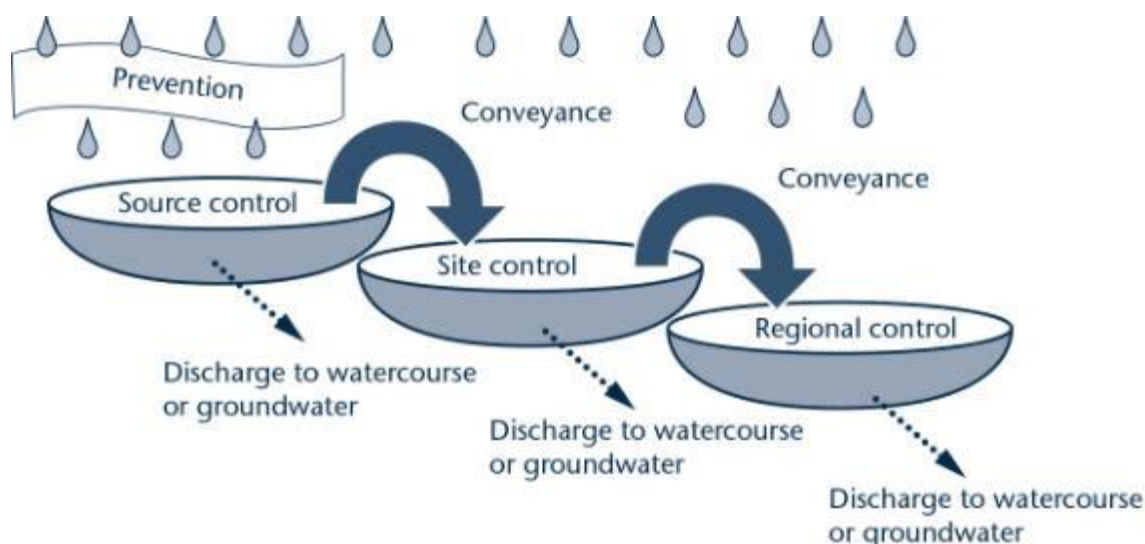
The non-statutory technical standards for sustainable drainage systems (March 2015) set out appropriate design criteria based on the following:

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.

In addition, the Local Planning Authority may set local requirements for planning permission that include more rigorous obligations than these 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. CIRIA has also produced a number of guidance documents relating to SuDS that should be consulted by the LPA and developers.

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<sup>27</sup>



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.

#### 6.8.1 North Yorkshire County Council SuDS Design Guidance

This guidance note details the requirements of North Yorkshire County Council, in its capacity as the LLFA, for SuDS design. This guidance applies to all major development in Harrogate District that the LLFA are consulted on as a statutory consultee (see section 1 of the NYCC SuDS Guidance). Decisions regarding SuDS and non-major development is a decision for HBC. The guidance provides direction to the relevant design guidance for the successful implementation of SuDS and is the basis on which planning consultations from Local Planning Authorities will be assessed. The full report can be found via the link:

#### 6.8.2 Harrogate Borough Council Supporting Drainage Information Chart for Planning Applications

Harrogate Borough Council has produced a drainage information chart for planning applications. The flow chart provides a system for developers to understand what their drainage requirements are for different types of development with different parameters. The document notes that all proposed planning submissions must include details of how applicants propose to deal with surface water drainage. This should be referred to alongside the NYCC guidance. The full chart is included within Appendix D.

## 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<sup>28</sup>. 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 the Government's strategic approach to:

- Ensuring all delivery bodies understand their respective roles and responsibilities when planning for and responding to flood related emergencies,
- Give all players in an emergency flooding situation a common point of reference which includes key information, guidance and key policies,
- Establish clear thresholds for emergency response arrangements,
- Place proper emphasis on the multi-agency approach to managing flooding events,
- Provide clarity on the means of improving resilience and minimising the impact of flooding events,
- Provide 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)<sup>29</sup>, HBC is classified as a Category 1 responder and has duties to assess the risk of emergencies occurring, and uses 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;
- 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 North Yorkshire Local Resilience Forum

HBC is a partner of the North Yorkshire Local Resilience Forum (NYLRF)<sup>30</sup>. The role of the Resilience Forum is to ensure an appropriate level of preparedness to enable an effective multi-

<sup>28</sup> <https://www.gov.uk/government/publications/the-national-flood-emergency-framework-for-england>

<sup>29</sup> <https://www.gov.uk/preparation-and-planning-for-emergencies-responsibilities-of-responder-agencies-and-others#the-civil-contingencies-act>

<sup>30</sup> <http://www.emergencynorthyorks.gov.uk/>

agency response to emergency incidents that may have a significant impact on the communities of Harrogate Borough Council and other boroughs within North Yorkshire County. NYLRF consists of representatives from the Emergency Services, all eight of North Yorkshire's local authorities (HBC, City of York Council, Craven District Council, Hambleton District Council, Ryedale District Council, Scarborough Borough Council, Selby District Council, Richmondshire District Council), the North Yorkshire and York PCT, the Yorkshire and the Humber SHA (part of the NHS Trust), the EA, Public Health England and the Maritime and Coastguard Agency.

#### 7.1.1.1 Community Risk Register

As a strategic decision-making organisation, the NYLRF prepared a Community Risk Register (CRR)<sup>31</sup>, last updated in 2013, 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. NYLRF has produced a template on how to produce a Community Emergency Plan, though some communities across Harrogate Borough already have one in place. To check whether a community already has an emergency plan in place, a map of the county is available via the following link:

[http://maps.northyorks.gov.uk/connect/analyst/?mapcfg=comm\\_emergency\\_plans](http://maps.northyorks.gov.uk/connect/analyst/?mapcfg=comm_emergency_plans)

For more information, communities should contact their town or parish council.

#### 7.1.1.3 Household Plans

The NYLRF recommends individual families should create a Household Plan and Grab Bag to prepare for emergencies. A template for creating a Household Plan is available via:

<http://emergencynorthyorks.gov.uk>

#### 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. HBC will be unable to write specific flood plans for new developments at flood risk. Developers should write their own. Guidance can be found on the EA web site<sup>32</sup>. 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;

<sup>31</sup> <http://www.emergencynorthyorks.gov.uk/index.aspx?articleid=11778>

<sup>32</sup> <https://www.gov.uk/prepare-for-a-flood/make-a-flood-plan>

- 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;
- 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.

Whilst there is no statutory requirement on the EA or the emergency services to approve evacuation plans, HBC is accountable under its 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 HBC 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, Yorkshire Water, Internal Drainage Boards and Canal & River Trust.

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 the Local Plan, and discussions within the North Yorkshire 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 HBC 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
<b>Availability of existing flood warning system</b>	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.
<b>Rate of onset of flooding</b>	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.
<b>How flood warning is given and occupants awareness of the likely frequency and duration of flood events</b>	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 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.



Consideration	Purpose
<b>The availability of staff / occupants / users to respond to a flood warning and the time taken to respond to a flood warning</b>	The plan should identify roles and responsibilities of all responders. The use of community flood wardens should also be considered.
<b>Designing and locating safe access routes, preparing evacuation routes and the identification of safe locations for evacuees</b>	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.
<b>Vulnerability of occupants</b>	Vulnerability classifications associated with development as outlined in the FRCC-PPG. This is closely linked to its occupiers.
<b>How easily damaged items will be relocated and the expected time taken to re-establish normal use following an event</b>	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.

### 7.3 Flood Awareness

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 Floodline Warnings Direct<sup>33</sup> service.

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.

<sup>33</sup> <https://www.gov.uk/government/organisations/environment-agency>  
2016s4478 HBC Level 1 SFRA Final Report v2.0.doc

## 8 Conclusions and Recommendations

### 8.1 Conclusions

This SFRA provides a single repository planning tool relating to flood risk and development in Harrogate District. Key flood risk stakeholders namely the EA, Yorkshire Water, North Yorkshire County Council, Lead Local Flood Authority and Canal & River Trust 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 sites identified in the SHELAA, with subsequent recommendations.

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

Whilst the aim of the sequential approach is the avoidance of high flood risk areas, in locations such as Harrogate, Ripon, Knaresborough, Masham, Pateley Bridge and Boroughbridge, where the council is looking for continued growth, this will not always be possible. This SFRA therefore provides the necessary links between spatial development, wider flood risk management policies, local strategies / plans and on the ground works by combining all available flood risk information together into one single repository. As this is a 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 Council to translate the information provided in this Level 1 SFRA into meaningful Local Plan policy for flood risk and water management:

#### ***Policy Recommendation 1: No development within Flood Zone 3b...***

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

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

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

#### ***Policy Recommendation 2: Consider surface water flood risk...***

...alongside fluvial risk, including possible withdrawal, redesign or relocation for sites at significant surface water risk.

Flood Risk Assessments should always consider surface water flood risk management and options for on-site flood storage.

***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 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.

This SFRA, the NPPF and FRCC-PPG should be consulted throughout this process.

**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
- Situated in an area currently benefitting from defences
- Situated within 20 metres of the bank top of a Main River
- Situated over a culverted watercourse or where development will be required to control or influence the flow of any watercourse

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

***Policy Recommendation 5: Use of appropriately sourced of SuDS...***

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

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

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

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

### **Policy Recommendation 6: Phasing of development...**

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

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

It may be possible that flood mitigation measures put in place at sites upstream could alleviate flooding at downstream or nearby sites.

### ***Policy Recommendation 7: Planning permission for at risk sites...***

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

- The NPPF and FRCC-PPG have been referenced together with appropriate consultation with the LLFA, the EA, Yorkshire Water and the IDB, where applicable
- The effects of climate change have been taken into account using the February 2016 allowances developed by the EA, though modelled climate change outputs are not available and have not been used in this Update
- There is no loss in 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
- Whether the development will be safe and has passed the 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 North Yorkshire LFRMS and PFRA, 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 would be of benefit to HBC and / or NYCC as the LLFA, in developing their flood risk evidence base to support the delivery of their Local Plan or to help fill critical gaps in flood risk information.

### **8.3.1 Level 2 SFRA**

The Council should review the sites where they expect the main housing numbers and employment sites to be delivered, using Section 6.5 of this report, the SFRA Maps in Appendix A and the Development Site Assessment spreadsheet in Appendix B. A Level 2 SFRA will be required if a large site, or group of sites, are within Flood Zone 3 and have 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 6.7.2, 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 show that a site will not increase risk to others and will be safe, once developed, and will pass the Exception Test, if required. A Level 2 study may also assess locations and options for the implementation of open space, or Green Infrastructure, to help manage flood risk in key areas.

The LPA will need to provide evidence in their Local Plan to show that the housing numbers (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.

Table 8-1: Recommended further work for HBC and / or NYCC

Type	Study	Explanation	Timeframe
Understanding of local flood risk	EA Flood Risk Mapping updates	EA modelling updates of older models e.g. River Ure and Tributaries 2010. 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 for available EA models, where applicable	Short term
CDA designation	Level 2 SFRA	Exploration of the possibility of designating official CDAs as notified to the LPA by the EA or identification of areas of critical drainage for use in HBC's Local Plan	Short term
Flood storage	Community Infrastructure Levy (CIL)	For new developments, GI assets can be secured from a landowner's 'land value uplift' and as part of development agreements. The LPA could include capital for the purchase, design, planning and maintenance of GI within its CIL programme.	Short term
Data Collection	Flood Incident Data	NYCC, in collaboration with HBC, has a duty to investigate and record details of locally significant flood events within the county. General data collected for each incident, should include date, location, weather, flood source (if apparent without an investigation), impacts (properties flooded or number of people affected) and response by any RMA.	Short Term / Ongoing
	FRM Asset Register	NYCC should continue to update and maintain their flood risk management register of structures and features, which are considered to have an effect on flood risk. This should be shared with HBC	Ongoing
Risk assessment	Asset Register Risk Assessment	NYCC, in collaboration with HBC, should carry out a strategic assessment of structures and features on the FRM Asset Register to inform capital programme and prioritise maintenance programme.	Short Term
Capacity	SuDS review / guidance	HBC should identify internal capacity required to deal with SuDS applications, set local specification and set policy for adoption and maintenance of SuDS.	Specification adopted

Type	Study	Explanation	Timeframe
Partnership	Yorkshire Water	HBC should continue to work with YWS on sewer and surface water projects.	Ongoing
	EA	NYCC / HBC should continue to work with the EA on fluvial and tidal flood risk management projects. HBC should also identify potential opportunities for joint schemes to tackle flooding from all sources.	Ongoing
	Canal & River Trust	NYCC / HBC should continue to work with the Canal & River Trust to understand the residual risks associated with the Ripon Canal and Ure Navigation and also asset owners of reservoirs.	Ongoing
	Community	Continued involvement with the community through NYCC's and HBC's existing flood risk partnerships.	Ongoing



## Appendices

### A SFRA Maps

#### **Interactive GeoPDF Maps**

Open the Overview Map in Adobe Acrobat (2016s4478\_HBC\_SFRA\_Overview.pdf). The Overview Map contains a set of four index squares covering four quarters of the district. Clicking on one of the four index squares will open up an Index Map for that area, by way of a hyperlink.

Each of the four Index Maps contain a further set of index squares covering different areas of the district at a scale of 1:10,000. Clicking on one of these index squares will open up a more detailed map of that area (scale = 1:10,000) by way of a hyperlink.

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

## B Development Site Assessment Spreadsheet

Excel spreadsheet containing an assessment of flood risk to the potential development sites based on Flood Zones 2, 3a, 3b and 3ai, as delineated through this SFRA, and also the updated Flood Map for Surface Water (uFMfSW).

## C Functional Floodplain and Flood Zone 3ai Delineation

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

## D Harrogate Borough Council Supporting Drainage Information Chart for Planning Applications

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consulting

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