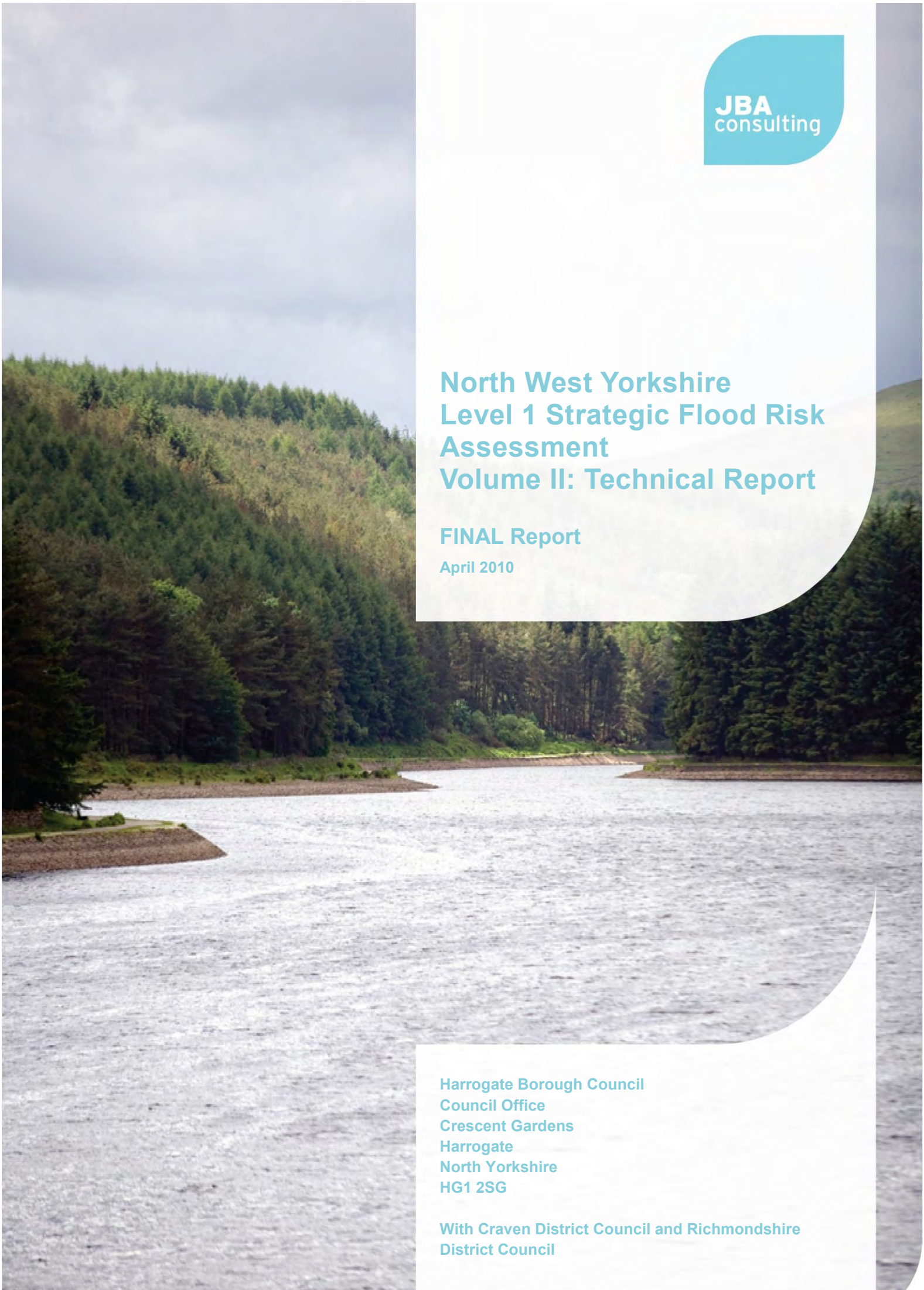

North West Yorkshire Level 1 Strategic Flood Risk Assessment Volume II: Technical Report

FINAL Report

April 2010

Harrogate Borough Council
Council Office
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North Yorkshire
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With Craven District Council and Richmondshire District Council

North West Yorkshire Level 1 SFRA

Volume II: Technical Report

FINAL Report

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Revision History

Revision Ref / Date Issued	Amendments	Issued to
Initial Draft: 9th October 2009	Initial DRAFT report	Linda Marfitt 1 copy of report by email (4 copies of report, maps and Sequential Testing Spreadsheet on CD)
FINAL report	Includes review comments from Linda Marfitt (HBC), John Hiles (RDC), Sam Kipling and Dan Normandale (EA). Floodzones for Ripon and Pateley Bridge updated to version 3.16.	Linda Marfitt (HBC), Sian Watson (CDC), John Hiles (RDC) and Dan Normandale (EA) - 1 copy of reports, maps and sequential test spreadsheet on CD)

Contract

This report describes work commissioned by Harrogate Borough Council, on behalf of Harrogate Borough Council, Craven District Council and Richmondshire District Council by a letter dated 01/04/2009. Harrogate Borough Council"s representative for the contract was Linda Marfitt. Judith Stunell and Mike Williamson of JBA Consulting carried out this work.

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Purpose

This document has been prepared as a final report for Harrogate Borough Council. JBA Consulting accepts no responsibility or liability for any use that is made of this document other than by the Client for the purposes for which it was originally commissioned and prepared.

JBA Consulting has no liability regarding the use of this report except to Harrogate Borough Council.

Acknowledgements

JBA would like to thank those who provided information and data for this report. From Harrogate Borough Council: Linda Marfitt and Mike Wood. From Craven District Council: Sian Watson and Laura Kennedy. From Richmondshire District Council: John Hiles and Nick Rourke. From the Environment Agency: Dan Normandale, Jonathan Boyes and Sam Kipling. From North Yorkshire Fire and Rescue Service: Carol Haughton. From Yorkshire Water: Stephanie Walden.

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Executive Summary

Local Planning Authorities (LPAs) have a raft of issues to consider when planning future development. These are dictated by Government Planning Policy Statements. Planning Policy Statement 25 (PPS25) relates to development and the constraint of flood risk, with its overarching aim of avoiding development in flood risk areas.

This is achieved through application of the sequential approach, meaning that development should be avoided in flood risk areas wherever possible before considering the vulnerability of development planned or possible mitigation measures.

The sequential approach is governed by two tests; the Sequential and Exception Test. The consideration of flood risk to people and development must be considered by the LPA at the earliest stage of spatial planning decisions and these tests allows this process to be transparent and effective.

In order to carry out these tests a coherent understanding of flood risk is needed at a local level. High level policy and guidance documents such as Catchment Flood Management Plans (CFMPs), Shoreline Management Plans (SMPs) and Regional Flood Risk Appraisals (RFRA) have provided a good introduction in to flood risk; however they do not provide the level of detail required for the LPA to make the right spatial planning decisions.

Strategic Flood Risk Assessments (SFRAs) offer this local level of understanding. SFRAs provide the LPA with a central source of all relevant flood risk information and the evidence base to make planning decisions and develop focused local policies required to inform the Local Development Framework (LDF). The SFRA therefore becomes a key planning tool that enables the LPA to select sustainable site allocations.

A Level 1 SFRA offers the foundation of this evidence base. It is based purely on the collation of existing flood risk information. The Environment Agency Flood Map is the main source of fluvial and tidal flood information across England and Wales and is the basis of PPS25 Flood Zones used in the Sequential Test. The Level 1 SFRA must also consider flooding from all other sources (surface water, sewers, groundwater and artificial sources). This is only achievable through consulting with those stakeholders with specific interest or knowledge in other sources of flooding.

The Level 1 SFRA is assisted greatly by the use of Strategic Flood Risk Maps providing information on flood risk factors needed to be taken into account. The PPS25 Flood Zone Map enables the LPA to carry out the first sweep of Sequential Testing. The additional maps produced as part of the Level 1 SFRA should be used during the Sequential Test „sieving" process to further identify inappropriate development.

Once the LPA has carried out the Sequential Test sieving process, they still may wish to allocate vulnerable development in high risk areas due to the wider need for economic growth and regeneration. In this case the allocations must pass the Exception Test. The evidence provided in the Level 1 SFRA is not detailed enough to justify development through the Exception Test. In order to achieve this Level 2 SFRA must be carried out.

A Level 2 SFRA would provide the LPA with a detailed understanding of flood hazard, assessing flood depth, velocity and residual risks such as flood defence breaching or overtopping. The information provided in the Level 2 SFRA will give the LPA a much more detailed understanding of flood risk at potential development sites. Although, it will not provide all the information needed to apply the Exception Test. It will indicate the appropriateness of the development and the likelihood of it remaining safe if flooded. If the LPA has justified the development by passing parts a) and b) of the Exception Test, it must be supported by a site specific Flood Risk Assessment (FRA) in order to pass part c).

North West Yorkshire Level 1 SFRA

This report has been produced as a Level 1 SFRA for Harrogate Borough Council, Craven District Council and Richmondshire District Council, in accordance with PPS25 and its Practice Guide.

The Level 1 SFRA is presented in two volumes, each with their own purpose and intended audience.

Volume I: User Guide

Volume I of the North West Yorkshire SFRA contains an introduction to the SFRA process and guidance on the use of the SFRA targeted at:

- Spatial Planners
- Development Control
- Developers
- Flood Risk Management
- Emergency Planners

Volume I has a number of appendices outlining flood risk concepts, Hierarchy of flood risk assessment, the planning framework including an overview of relevant policies plans and strategies that inform the SFRA, stakeholder engagement in the SFRA process, Flood risk zones, classification of vulnerability and approach to sustainable drainage methods.

These provide a brief understanding of the mechanisms of flooding and flood risk for those new to the subject. More importantly it provides a comprehensive discussion on PPS25, the Sequential and Exception Test and links the Flood Risk Management framework within national, regional and local flood risk assessments.

Volume II: Level 1 SFRA Technical Report

Volume II provides the technical information and methods used in the assessment of flood risk across North West Yorkshire. It initially begins with the „Consultation & Data Management" section, identifying key stakeholders and their involvement in the SFRA process flowed by a review of important data sources within the SFRA.

The main sections within the report focuses on the assessment of all sources of flooding include; fluvial, tidal, surface water, sewers, groundwater and reservoirs and other artificial sources. The Volume also introduces the Environment Agency Flood Warning System.

As discussed flood risk has many dimensions and as a result has been presented through a suite of maps. These are based on existing information from stakeholders including the Environment Agency, Harrogate, Craven and Richmondshire Councils, Yorkshire Water, North Yorkshire Fire and Rescue Service and North Yorkshire County Council.

The SFRA maps include:

Maps	Title	Reference
Set A	PPS25 Flood Zones	H1-26, C1-10, R1-13
Set B	1 in 100 Year Flood Depths	H1-46, C1-6, R1-23
Set C	1 in 100 Year Flood Hazards	H1-46, C1-6, R1-23
Set D	Climate Change Sensitivity	H1-9, C1-4, R1-3
Set E	Flood Risk Management	H1-19, C1-6, R1-7
Set F	Refined Surface Water Flooding	H1-H9, C1-C9
Set G	Historical Flooding	H1-4, C1-2, R1-3

Volume II along with the suite of SFRA maps should provide the evidence base of the North West Yorkshire Level 1 SFRA. It has been arranged in one volume to allow technical information to be easily updated when reviewed.

Section 6 provides the results of the first pass of the Sequential Test against Harrogate BC, Craven DC and Richmondshire DC development allocation sites. Section 7, 8 and 9 contain tables summarising key information for sites in the three LPAs.

Finally Section 7 contains SFRA recommendations; this includes brief summaries of flood risk and recommendations for Level 2 investigations in key settlements.

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Abbreviations

AAP	Area Action Plan
ABD	Areas Benefiting from Defences
AEP	Annual Exceedance Probability
CDA	Critical Drainage Area
CFMP	Catchment Flood Management Plans
CLG	Communities and Local Government
COW	Critical Ordinary Watercourse
CRR	Community Risk Register
CS	Core Strategy
DPDs	Development Plan Documents
DRN	Detailed River Network
EA	Environment Agency
EU	European Union
FAS	Flood Alleviation Schemes
FEH	Flood Estimation Handbook
FCERM	Flood and Coastal Erosion Risk Management
FRA	Flood Risk Assessment
FRM	Flood Risk Management
IDB	Internal Drainage Board
IDD	Internal Drainage District
IFM	Indicative Floodplain Map
LCR	Leeds City Region
LDDs	Local Development Documents
LDF	Local Development Framework
LPAs	Local Planning Authorities
LRF	Local Resilience Forum
NEA	North East Assembly
NFCDD	National Fluvial and Coastal Defence Database
NLRF	Northumbria Local Resilience Forum
NPD	National Property Dataset
NYCC	North Yorkshire County Council
NYLRF	North Yorkshire Local Resilience
NYFRS	North Yorkshire Fire and Rescue Service
PFRA	Preliminary Flood Risk Assessment
PPG	Planning Policy Guidance
PPS	Planning Policy Statement
RBD	River Basin District
RBMP	River Basin Management Plan
RFRA	Regional Flood Risk Assessment
RPB	Regional Planning Bodies
RPG	Regional Planning Guidance
RRF	Regional Resilience Forum
RSS	Regional Spatial Strategy
RVFD	Receptors Vulnerable to Flooding Database
SA	Sustainability Appraisal
SCI	Statement of Community Involvement
SEA	Strategic Environmental Assessment
SFRA	Strategic Flood Risk Assessment

SFVI	Social Flood Vulnerability Index
SHMA	Strategic Housing Market Assessment
SMP	Shoreline Management Plans
SoP	Standard of Protection
SPD	Supplementary Planning Document
SuDS	Sustainable Drainage Systems
SWMP	Surface Water Management Plan
UDP	Unitary Development Plan
WCS	Water Cycle Study
WFD	Water Framework Directive
YW	Yorkshire Water

1 Introduction

1.1 Commission

JBA Consulting was commissioned in June 2009 by Harrogate Borough Council, Craven District Council and Richmondshire District Council to undertake a review of their existing North West Yorkshire Strategic Flood Risk Assessment (SFRA) and update it in accordance with the current requirements of Planning Policy Statement 25 (PPS25).

Building on information already available, a Level 1 SFRA study was undertaken to identify and analyse current and future flooding issues for key locations in each local authority area to support LPA assessment of specific development allocation sites.

1.2 North West Yorkshire Level 1 SFRA Volume II

The purpose of this investigation is to provide a spatial assessment of flood risk within North West Yorkshire, and to build on the detail included in the Yorkshire and Humber Regional Flood Risk Appraisal. Together these sources will assist the Local Development Framework (LDF) and the policies and proposals produced for the development and use of land within Harrogate BC, Craven DC and Richmondshire DC.

This technical volume of the Level 1 SFRA introduces the key sources and mechanisms of flood risk in North West Yorkshire and measures that are taken to manage the risk. This volume then provides sufficient data and information to inform the application of the Sequential Test by the three Local Authorities. This information includes the suite of strategic flood risk maps:

Maps	Title	Reference
Set A	PPS25 Flood Zones	H1-26, C1-10, R1-13
Set B	1 in 100 Year Flood Depths	H1-46, C1-6, R1-23
Set C	1 in 100 Year Flood Hazards	H1-46, C1-6, R1-23
Set D	Climate Change Sensitivity	H1-9, C1-4, R1-3
Set E	Flood Risk Management	H1-19, C1-6, R1-7
Set F	Refined Surface Water Flooding	H1-9, C1-9
Set G	Historical Flooding	H1-4, C1-2, R1-3

To aid Harrogate, Craven and Richmondshire Councils undertaking the Sequential Test, a spreadsheet has been developed which provides the results of a spatial assessment for each proposed development site against Flood Zones and surface water susceptibility zones. The analysis includes area (ha) and percentage (%) cover of each zone and the proposed development land use.

Site tables have been prepared for sites at risk of flooding and are found in section 7 (Harrogate BC sites), section 8 (Craven DC sites) and section 9 (Richmondshire DC sites).

This volume then provides recommendations for further work.

1.3 North West Yorkshire SFRA Study Area

This study comprises the local authority areas of Craven District Council, Harrogate Borough Council, and Richmondshire District Council. Yorkshire Dales National Park is not part of this assessment although actions taken in the National Park have the potential to influence flood risk downstream and we have considered these where appropriate. The area is characterised by a number of urban centres including Skipton, Harrogate, Knaresborough, Ripon, Richmond and a number of villages. The SFRA concentrates on future development within the districts, which will generally occur around these existing urban areas.

1.3.1 Craven District

Craven (outside the Yorkshire Dales National Park) covers an area of 370km². The population of the whole District is approximately 56,000 (2007 ONS Mid Year estimates[1]). The A65 to the north of Skipton and the A59 east towards Harrogate roughly delineate the edge of the Yorkshire Dales National Park. The consequences of this are that the planning control in some villages is divided between the National Park Authority and Craven District Council. Skipton, the largest town in the District, is the District centre of Craven. 14650 people (31% of the population in Craven (outside the YDNP)) live in Skipton. Other large settlements include Settle, Ingleton, Hellifield, Glusburn and Sutton-in-Craven. The area is predominantly rural[2].

The main rivers in the District include the rivers Greta, Wenning, Ribble, Aire and Wharfe – each of these has a number of tributaries, many of which also qualify as "main rivers" themselves (see also Volume 1 Appendix D for more information about Craven).

1.3.2 Harrogate District

Harrogate District covers an area of 1,308 km², is situated to the north of Leeds and Bradford and on the eastern periphery of the Yorkshire Dales. Population of the district is 158,800 (2007 mid year estimates[3]). The largest settlements are Harrogate (pop. 73430, Knaresborough (pop. 14780) and Ripon (pop. 15940).

The main activities in the countryside are agriculture and forestry. Agriculture varies throughout the District and is dependent on the quality of the land; it ranges from intensive arable farming in eastern third of the District (in the Vale of York) to mixed arable crops and grazing land in the central part and some western areas. In the west, as land increases in height, pasture land becomes dominant (at 200-300m above sea level). Above this height, unimproved open moor can be found, often with heather to maintain grouse moors. In the Nidderdale area there are a number of reservoirs which have woodland around them – most are mixed or conifer plantations, some are deciduous[4].

The rivers Swale, Ure and Ouse flow southward through the Vale of York; the River Wharfe flows along the southern boundary of the District (see also Volume 1, Appendix D for additional information about Harrogate District).

1.3.3 Richmondshire District

Richmondshire District (outside the Yorkshire Dales National Park) covers an area of approximately 567km². However, most of the resident population (86% of a total of 51,300 (2000 figures)) is located in this area.

The area is predominantly rural; the main market towns include Richmond, Leyburn and Hawes. To the east lie the settlements of Catterick, Scotton, Hipswell, Colburn and Brompton-on-Swale. Reeth is a service centre for the upper Dales[5].

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[1] North Yorkshire County Council, *Parish Population Estimates 2007*. http://www.northyorks.gov.uk/CHttpHandler.ashx?id=1636&p=0

[2] Craven District Council. Internet. http://www.cravendc.gov.uk/

[3] Population estimates for 2007 collated by North Yorkshire County Council http://www.northyorks.gov.uk/CHttpHandler.ashx?id=1636&p=0

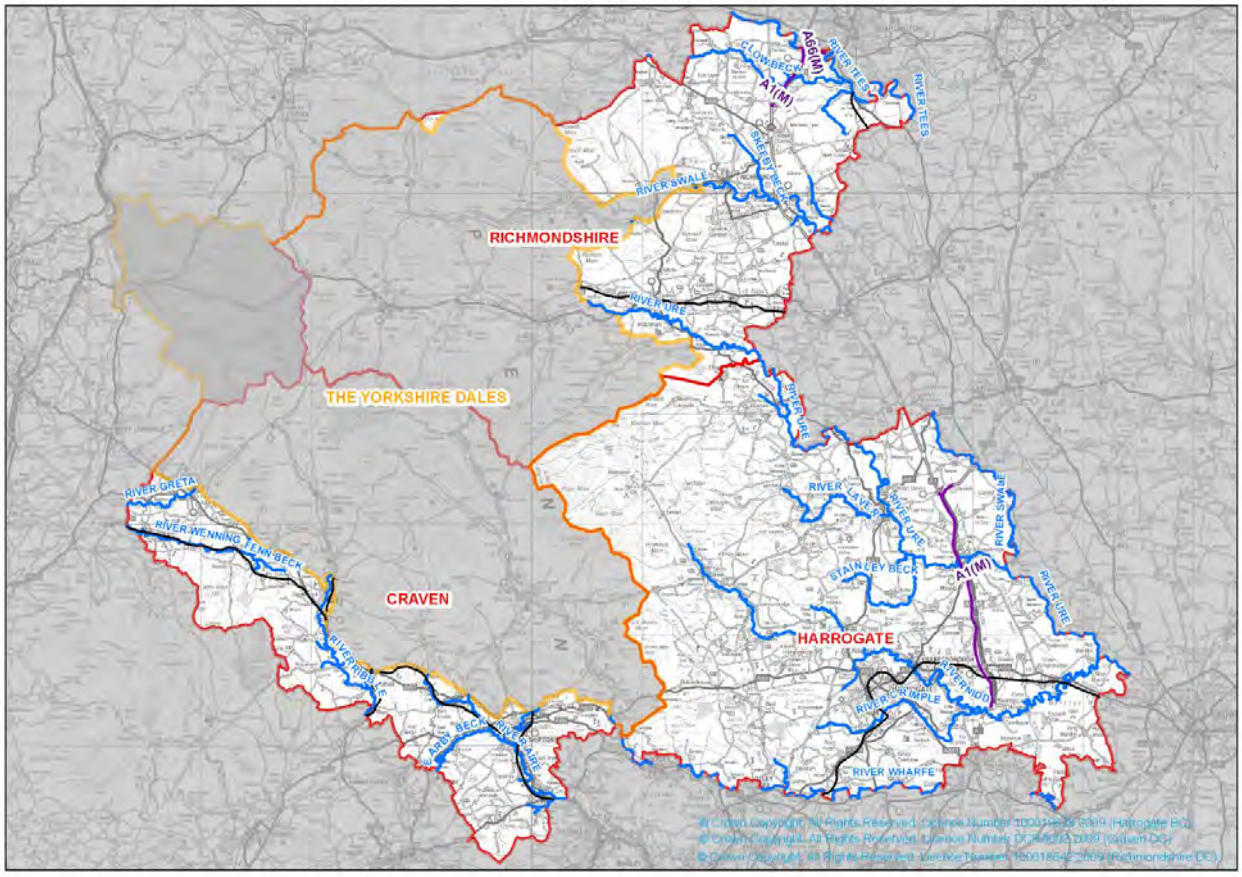
[4] Harrogate Borough Council. 2009. *Local Development Framework, Core Strategy*. http://www.harrogate.gov.uk/immediacy-2320

[5] Richmondshire District Council. 2008, *Local Development Framework, Core Strategy Preferred Options*

The main rivers include the River Swale, Clow Beck, Spa Beck, River Tees, Scorton Beck, Bedale Beck and the River Ure (see also Volume 1, Appendix D for more information about Richmondshire).

Figure 1-1 provides a graphical overview of the North West Yorkshire Level 1 SFRA study area including Main Rivers and key infrastructure.

Figure 1-1: North West Yorkshire SFRA Study Area



1.4 Upstream Area - Yorkshire Dales National Park

The Yorkshire Dales National Park is located upstream of the SFRA area. The YDNP contains the headwaters of the major rivers and actions taken in the National Park area have the potential to influence flow downstream.

The YDNP Planning Authority were partners in the 2006 NW Yorkshire SFRA but chose not to participate in this update as they currently have no allocated development sites. The YDNP Planning Authority are progressing their Housing DPD. They do not have any regional targets for housing and any development is likely to be focused in the larger settlements of Sedburgh, Hawes, Grassington and Reeth. There is a shortage of affordable housing in the National Park area but any development is likely to be small scale[6].

Any change in land use in the YDNP is likely to be small scale for example woodland development and improvements. The YDNP are partners in the Yorkshire Peat

Consultation.
http://www.richmondshire.gov.uk/PDF/Core%20Strategy%20Preferred%20Options%20consultation.pdf.
6 Peter Stockton, Town and Country Planning, Yorkshire Dales National Park, Pers com. August 2009

Partnership (along with the Environment Agency, Yorkshire Water, Natural England and the Yorkshire Wildlife Trust) which aims to coordinate small scale peat restoration projects underway or planned in the YDNP area. Actions which may influence river flow include moorland grip blocking with blocking of more than 2000km proposed by 2013. The Yorkshire Peat Partnership is also funding research into the influence of moorland hydrology on downstream flooding[7].

7Paper to YDNP Authortiy Meeting on 28th July 2009. http://www.yorkshiredales.org.uk/index/looking_after/the_national_park_authority/committee_meetings/authority-full/authority_-_july_2009.htm

2 Consultation and Data Management

2.1 Consultation Process

To carry out an appropriate and comprehensive assessment of flood risk across North West Yorkshire, it is essential to collate and build upon the best available data and studies already carried out. This information is the foundation of the SFRA.

The Environment Agency Flood Map is the main source of fluvial and tidal flooding information across England and Wales and is the basis of PPS25 Flood Zones. The SFRA must also consider flooding from all sources and this is only achievable through consulting with those stakeholders with specific interest or knowledge in other sources of flooding. This data collection process is a key part of the SFRA and has enabled this SFRA to be based on a significant amount of information that already exists on North West Yorkshire.

PPS25 outlines a number of key consultees to the planning process, which are discussed below and their involvement within the North West Yorkshire SFRA.

2.2 Key Stakeholders

2.2.1 Harrogate Borough Council, Richmondshire District Council and Craven District Council

Harrogate BC were the lead authority for the preparation of this SFRA, along with Richmondshire DC and Craven DC. They focused the scope of the SFRA and provided the detail needed for its production.

An initial SFRA meeting was held to discuss the requirements of PPS25 in producing a Level 1 SFRA and to determine the main tasks needed to be completed. The meeting also outlined the Council"s own timetable relating to preparing an evidence base for their LDF process.

Correspondence has occurred since the initial meeting requesting information on historical flooding and work currently being prepared by their Emergency Planning Team in preparing a Flood Plan for the Council.

Each council supplied several datasets covering their council area including:

- Proposed development allocations (these are currently subject to assessment);
- Areas Susceptible to Surface Water Flooding maps; and
- OS MasterMap and address point data.

The council's Emergency Planning Teams also provided some knowledge of current local and regional Flood Plans.

2.2.2 Environment Agency

The Environment Agency is a statutory consultee for RSSs, LDDs, Sustainability Appraisals and Strategic Environmental Assessments. They are also a statutory consultee for planning applications.

With regards to the North West Yorkshire SFRA, the Environment Agency has discretionary powers under the Water Resources Act (1991) to manage flood risk and, as a result, hold most flood risk data in the UK. Separate departments were consulted through a single point of contact including Development Control, Flood Mapping and Reservoir Safety Teams on the SFRA approach and available data. A full list of data provided by the Environment Agency is available in the Data Register discussed in Section 2.2.7 but the main themes can be summarised below:

- Strategic flood risk mapping models, outlines and modelling reports;

- LIDAR data (Geomatics Group);
- Historical flood data including Flood Event Outlines;
- Flood warning data;
- Reservoir locations;
- Asset data including the National Flooding and Coastal Defence Database (NFCDD) and Detailed River Networks (DRNs);
- Areas Benefitting from Defences (ABDs).

2.2.3 Highways Agency - North Yorkshire County Council

All major roads and motorways have the potential to influence flood risk. This is especially the case in an urban environment when roads can form potential flow routes or major structures such as bridges or culverts can significantly reduce the capacity of watercourses and therefore increase flood risk. Road networks that are at risk of flooding also have the potential for wider impacts reducing access and egress routes to and from sites which could increase the vulnerability of areas to flooding.

The Highways Agency at North Yorkshire CC was consulted on all known flood incidents on their road networks. Our contact for the Richmondshire area provided some useful background information regarding flooding of highways. The contact for Harrogate Borough provided us with a flood incident dataset which could be mapped. Craven DC provided information about known flooding hotspots including some roads.

2.2.4 Yorkshire Water

Local water authorities are identified as a key consultee within PPS25 as they are generally responsible for surface water drainage from developments. This SFRA should therefore take into account any information they may hold on capacity issues or known historical flood incidents.

Sewers are a significant source of flooding especially within urban areas. The main source of information requested from Yorkshire Water was a copy of their DG5 records. Yorkshire Water has provided internal and external DG5 records at postcode level which has been referred to within the Level 1 SFRA.

2.2.5 North Yorkshire Fire & Rescue Service

Emergency services are a good source of historical flood data. For instance when the fire brigade are called out to flood related incidents, they keep a detailed register of all call outs which includes the source of flooding and the action taken.

The North Yorkshire Fire and Rescue Service (NYFRS) were extremely helpful in providing this information producing a database of over 4000 flood related call outs dating from to June 1997 to March 2009.

2.2.6 Internal Drainage Boards (IDB)

The North West Yorkshire SFRA area is covered by three IDBs:

- Claro IDB
- Airedale and Marston Moor IDB
- Lower Swale IDB

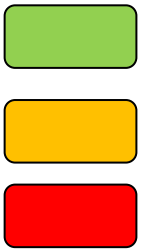
The IDBs have responsibility for water level management (excluding main rivers) in their district under the Land Drainage Act 1991. IDBs have good local knowledge of historical flooding and local flood risk management activities. Although none of these IDBs keep records of specific flood incidents they provided some anecdotal information about flooding in rural areas.

2.2.7 SFRA Data Management & Review

This SFRA should be viewed as a „living" document which is anticipated to be used in the day-to-day process of planning and development.

Therefore it is important that datasets collected for the North West Yorkshire SFRA are transparent and accessible. A Data Register has been produced and supplied to Harrogate, Craven and Richmondshire Councils listing all data received throughout the SFRA process.

All data was reviewed on receipt and its quality and confidence rated for use in the SFRA. This process was purely based on professional judgement and rated on the scaling below.



High

Medium

Low

Most of the data requested was of a high quality as expected. Most of the datasets could be mapped geographically using a GIS to help visualise the risk of flooding, others were not and assessed as lower quality. Some of the detailed modelling studies provided were either of poor quality or had been superseded by newer, more up-to-date studies thus were not used in the SFRA. Historical flooding information was generally good. Flood Event outlines provided by the EA were of high quality stating source of flooding and the area flooded and could be plotted on a map. Other historical flooding from the councils was based on local knowledge and not available as a GIS dataset.

The Data Register will allow intended users of the SFRA to review the accuracy, currency and relevance of all datasets used and for a central group to manage and update datasets when needed. The Data Register also provides details of all contacts who supplied the data. The organisations listed should be the first contact for any update to the SFRA to make sure the most up-to-date datasets are used.

This register will also allow for a control on the publication and release of SFRA data to third parties outside of the main stakeholders. Initially the SFRA report and associated maps should be published on the Harrogate BC, Craven DC and Richmondshire DC websites as the central source of SFRA data and available to download. However, if a third party requests additional data (i.e. GIS data, hydraulic models), they should be advised to contact the original supplier of the dataset directly as there maybe licensing issues involved. If data is supplied by the LPAs, this should be logged in the outgoing data section of the register.

2.3 SFRA Data Gaps

The next chapter of this volume, “Data Sources”, provides a review of all major flood risk information collected for the North West Yorkshire SFRA including:

- Environment Agency Flood Map
- NFCDD and DRNs
- Hydraulic Modelling Studies
- Topographic data
- Historical Flooding Incidents.

During the data collection phase, it became apparent that there are some data gaps in flood risk information relevant to the North West Yorkshire SFRA. Whilst the majority of key information was available for main sources of flooding in the study area, the most significant missing data highlighted in Volume II included:

- Highways flooding information for Craven District from Highways Agency
- Comprehensive climate change outlines covering more watercourses
- NextMap Britain data for Settle in the Craven District for use in surface water modelling

2.4 SFRA Monitoring

This SFRA has been produced using the most up-to-date national guidance and flood risk data, it is recommended that the SFRA should be updated on a regular basis. The Environment Agency has suggested this be every 3 to 4 years, unless there is a significant flood affecting the area generating new information about flood risk. A review of the SFRA should also be undertaken if there are any major national policy changes, including updates to PPS25 and its Practice Guide.

Key studies and datasets may be updated in the future, these should be incorporated in any further updates to the SFRA. Table 2-1 contains a list of SFRA review triggers. Not all future changes to information should trigger an immediate full update of the SFRA, however new information should be collected and kept along side the SFRA until it is updated.

All datasets collected for the SFRA have been supplied to Harrogate, Craven and Richmondshire Councils in the form of the SFRA report, maps and figures. GIS data used to produce the maps have also been supplied. Once maps or the SFRA document is updated it should be reissued to the relevant stakeholders.

Table 2-1: SFRA Review Triggers

Trigger	Sources	Possible Timescale
CFMPs (Lune, Ribble, Aire, Ouse and Tees)	Environment Agency	Updated every 5 years
Flood Zones	Environment Agency	Updated quarterly
NFCDD	Environment Agency	Ongoing
Significant Flood Events	All	Unknown
Sewer Flood Data	Yorkshire Water	Unknown
Planning Policy	Communities & Local Government	Unknown
Completion of SWMP/Drainage Strategy	Harrogate Borough, Craven District & Richmondshire District Councils	Unknown

3 Data Sources

3.1 Flood Zone Map

The Environment Agency Flood Zone Map provides an overview of areas considered susceptible to flood risk in the study area as a result of fluvial and tidal flooding. These maps have been prepared in a consistent manner across England and Wales and provide an estimation of the extent of flooding for both the 1 in 100 year (1%) and 1 in 1000 year (0.1%) events. Version 3.14 of the flood map was used for this SFRA.

The Flood Zone Maps were prepared using a methodology based on the national digital terrain model (NextMap), derived river flows (Flood Estimation Handbook (FEH)) and two dimensional flood routing.

The theoretically derived Flood Zone extents have been adjusted in some locations where the results are inconsistent with historical flooding extents, more detailed flood mapping studies are available or where there are known errors in the digital terrain model. In North West Yorkshire, some fluvial Flood Zones have already been updated with the results of detailed flood mapping studies (see Section 3.4 for an overview).

The Environment Agency Flood Zone Maps are precautionary in that they do not take account of flood defences because these can be breached, overtopped and may not be in existence for the lifetime of the development and, therefore, represent a worst-case extent of flooding. They do not consider other forms of flooding and do not take account of climate change.

PPS25[8] divides the country into three basic Flood Zones, Flood Zones 1, 2 and 3, corresponding to areas of low, medium and high flood risk, respectively.

Table 3-1: Definition of Flood Zones

Flood Zone	Risk	Description
1	Low	The annual probability of flooding within this zone is less than 0.1%. This is can be easily defined as areas within the Council area located outside either Flood Zone 2 or 3.
2	Medium	The annual probability of fluvial flooding within this zone is between 0.1% and 1% (or between 0.5% and 0.1% for tidal flooding). In general, Flood Zone 2 is considered suitable for most development except highly vulnerable land uses where the Exception Test is required, such as police stations, fire stations and ambulance stations.
3a	High	Table D.1 of PPS25 “This zone comprises land assessed as having between a 1% and 0.1% annual probability of flooding or between a 0.5% and 0.1% annual probability of sea flooding in any year.”
3b	Functional Floodplain	Table D.1 of PPS25 “This zone comprises land where water has to flow or be stored in times of flood”

[8] Communities and Local Government (2006) Planning Policy Statement 25: Development and Flood Risk

3.2 Delineation of the Functional Floodplain

3.2.1 PPS25 Definition

PPS25 defines the Functional Floodplain as land where water has to flow or be stored during a flood. This is called Flood Zone 3b.

3.2.2 Flood Zone 3b

PPS 25 suggests that a 5% flood event (1 in 20 years) provides a suitable outline for Flood Zone 3b but that other outlines can be used depending on the characteristics of the river catchment. The LPA and Environment Agency agree what outline is to be used for Flood Zone 3b. NW Yorkshire SFRA uses 1 in 25 year outlines which were provided by the EA. PPS25 only allows water compatible land use in this area plus Essential Infrastructure (provided the Exception Test has been passed).

Developed and defended areas are excluded from the Functional Floodplain as water is not currently able to flow freely during a flood. Section 5.2.1 describes in detail how the Functional Floodplain was produced for North West Yorkshire.

3.2.3 Proposed Extension to Flood Zone 3b (Candidate Flood Zone 3b)

SFRAs can also identify areas where it might be appropriate to expand or restore the functional floodplain. This provides the opportunity to safeguard areas along main rivers where water flows or is stored in a flood but which are not in an area covered by a detailed modelling study.

This safeguards both urban and rural areas against development/ redevelopment, allowing existing open space to be used for flood storage, effectively reducing flood risk downstream. This process assists Flood Zone 3 policy aims, identified in table D.1 in PPS25, which include:

- *"Reduce the overall level of flood risk in the area through the layout and form or the development and the appropriate application of sustainable drainage systems,"*
- *"Create space for flooding to occur by restoring functional floodplain and flood flow pathways and by identifying, allocation and safeguarding open space for flood storage."*

An extension to the Functional Floodplain (Flood Zone 3b) in North West Yorkshire is proposed. This extension includes undeveloped areas in Flood Zone 3 which should be safeguarded from development and remain available to store floodwater in the future. This is described in detail in section 5.2.1. The SFRA should be fully integrated with CFMPs and other Strategies that show, at catchment scale, the need to protect the floodplain and avoid inappropriate development in high flood risk areas.

3.3 Flood Defences

The Environment Agency Flood Zones do not take account of the presence of flood defences. PPS25 states that defended areas (i.e. those areas that are protected to some degree against flooding by the presence of a formalised flood defence) are still at risk of flooding, and therefore sites within these areas must be assessed with respect to the adequacy of the defences.

The Environment Agency's National Flooding and Coastal Defence Database (NFCDD) has been supplied and provides information of existing defences in the area, as well as categorising them by type and providing information on who owns and maintains them. Areas Benefiting from Defences (ABDs) have also been provided. ABDs are those areas which benefit from formal flood defences in the event of flooding from rivers with a 1% chance in any given year or from the sea with a 0.5% chance in any given year. If the defences were not there, these areas would be subjected to increased flood risk.

3.4 Hydraulic Modelling Studies

Some of the Main Rivers in the Harrogate BC, Craven DC and Richmondshire DC areas have been the subject of detailed hydraulic modelling studies. In these areas the Flood Zones provide a good representation of actual flood risk. In other areas the Flood Zones have been produced using less detailed models. The Environment Agency provided a number of hydraulic models for this SFRA. These studies produced outlines for a range of flood events between 20% and 0.1% probability. Such studies may also produce a climate change outline which is for a 1% event plus a 20% increase in peak river flow. Table 3-2 identifies the location, the date of the study, the type of river model and (where available) the location and number of properties at risk in a 1% event. No additional analysis of numbers of properties at risk have been carried out for the level 1 SFRA.

Table 3-2: River Modelling Studies in the SFRA Area

Settlement	Watercourse and Study	Model	Properties at Risk in a 1% Flood Event (modelled and/or observed)	Local Authority
Croft on Tees Cleasby	River Tees Study (JBA Consulting, 2008)[a]	ISIS (TUFLOW and JFLOW used for the flood plain at Croft)	Croft - 106 Cleasby - 38	Richmondshire DC
Catterick and Catterick Garrison	Brough Beck (known locally as Scour Beck) (JBA Consulting, 2008)[b]	HECRAS and JFLOW for mapping the floodplain	Not reported	Richmondshire DC
West Gilling	Gilling Beck Study - (Halcrow, 2006)[c]	ISIS	26	Richmondshire DC
Appersett (YDNP)	Widdale Beck (Halcrow, 2007)[d]	ISIS - TUFLOW	Not reported	Richmondshire DC (YDNP Planning Authority area)
Ripon	River Ure, River Skell and River Laver (Halcrow, 2004)[e] Update (2008)	ISIS /Infoworks RS	Not reported	Harrogate BC
Knaresborough	River Nidd Study (Babtie, Brown and Root, 2003)[f] River Nidd Update (JBA Consulting, 2006)[g]	HECRAS	50 (41 properties flooded in Autumn 2000 flood event)	Harrogate BC
Masham	Swinney Beck Study (JBA Consulting, 2005)[h]	HECRAS with JFLOW to model flow over embankments	97	Harrogate BC
Markington	Markington Beck	ISIS	21	Harrogate BC

Settlement	Watercourse and Study	Model	Properties at Risk in a 1% Flood Event (modelled and/or observed)	Local Authority
	Study (Atkins, 2009)[i]			
Bishop Monkton	Bishop Monkton Beck Study (JBA Consulting, 2006)[j]	HECRAS	44	Harrogate BC
Shaw Mills	Thornton Beck Study (JBA Consulting, 2005)[k]	HECRAS and JFLOW	13	Harrogate BC
None at risk in SFRA area (river forms southern boundary of Harrogate Borough)	River Wharfe (Halcrow 2009)[l]	ISIS	Not reported	Harrogate BC
River Aire	Upper Aire Strategy (2005)	Not known	Report not available	Craven DC
Skipton	Eller Beck and Waller Hill Beck Study (Atkins, 2000)[m]	ISIS	No property numbers available	Craven DC
Sutton in Craven (Glusburn)	Glusburn Beck SFRM (Atkins, 2007)[n]	ISIS and TUFLOW for river modelling. INFOWORKS for detailed drainage modelling	140 properties flooded in 2004	Craven DC
Settle	River Ribble - Settle and Low Moor Flood Mapping Study (JBA Consulting, 2006)[o]	ISIS	205 properties in Settle	Craven DC
Low Bentham and High Bentham	Lune 2 Tributaries (JBA Consulting, 2004)p	HEC-RAS and JFLOW	22 properties in High Bentham 56 Properties in Low Bentham	Craven DC
Communities at risk upstream of SFRA area	Earby Beck (Atkins, 2003)[q]	ISIS	Not Reported	Craven DC

a. The Environment Agency, River Tees Model Update, Phase 2 Final report, January 2008, JBA Consulting
b. The Environment Agency, Brough Beck Catterick Floodplain Mapping Final report, February 2008 JBA Consulting
c. The Environment Agency, Gilling Beck Flood Mapping Study, 2006, Halcrow
d. The Environment Agency, 2007. Widdale Beck Flood Risk Mapping Study, Final Report, Halcrow.
e. The Environment Agency, Ripon Flood Alleviation scheme Modelling Study, 2004, Halcrow

Settlement	Watercourse and Study	Model	Properties at Risk in a 1% Flood Event (modelled and/or observed)	Local Authority

f. The Environment Agency, River Nidd at Knaresborough Modelling and Flood Mapping, Final Report June 2003, Babtie, Brown and Root and JBA Consulting,
g. The Environment Agency, River Nidd at Knaresborough Model Update, Final Report April 2006, JBA Consulting.
h. The Environment Agency, Swinney Beck - Dales Area Floodplain Mapping phase 2. May 2005, JBA Consulting
i. The Environment Agency, Markington SFRM, Draft Report July 2009, Atkins
j. The Environment Agency, Bishop Monkton Beck Flood Mapping Study Final Report, September 2006 JBA Consulting
k. The Environment Agency, 2005. Flood Risk Mapping Phase 2 Studies Thornton Beck Shaw Mills, JBA Consulting
l . The Environment Agency, 2009, River Wharfe Flood Mapping and NFCDD, Final Report, Halcrow Group
m. The Environment Agency, Eller Beck and Waller Hill Beck S105 Studies, Final Modelling Report and Summary Results Report, 2000, Atkins.
n. The Environment Agency, Glusburn Beck SFRM, Final Report 2007, Atkins.
o. Settle and Low Moor Flood Mapping Study, Final Report June 2006, JBA Consulting.
p. The Environment Agency, 2007, Lune 2 Tributaries, Final Report, JBA Consulting
q. The Environment Agency, 2003. Section 105 Flood Mapping Earby Beck, Atkins

3.5 Topographic Data

The essential dataset required for the refined surface water flood modelling and mapping for this SFRA is a Digital Elevation Model (DEM). There are five main sources of DEM data available for North West Yorkshire, as shown below in Table 3-3.

Table 3-3: DEM Availability

Data type	Owner	Resolution	Filtering	Date Flown
NextMap Britain - SAR	Environment Agency	5m	Filtered	-
LIDAR	Environment Agency	2m	Filtered & unfiltered	2000, 2001, 2003, 2005, 2006
LIDAR	Environment Agency	1m	Filtered & unfiltered	2004, 2006, 2009
LIDAR	Environment Agency	0.5m	Filtered & unfiltered	2008
LIDAR	Environment Agency	0.25m	Filtered & unfiltered	2006

All LIDAR datasets have been be re-sampled to 4m and merged together with the NextMap data to create a complete DEM surface and improve processing time during the surface water modelling. LIDAR, where available, was used in preference to NextMap data as it has a higher vertical accuracy.

3.6 Historical Flooding

There are a number of information sources of historical flood information. Most historical data collected was received from key stakeholders during the SFRA consultation process or by reviewing past flood studies in the area. Key historical flood datasets collected are identified in the table below, and are discussed for each river system in the next chapter.

Table 3-4: Sources of Historical Flood Information

Source of Historical Flood Information	Dataset
Environment Agency	• Flood Event Outlines (FEOs) • Hydraulic Modelling Study Reports. (Many of the studies listed in Table 3-2 include detailed summaries of historical flooding collected from sources including historical records and newspapers, local authority, Environment Agency and residents.)
Harrogate Borough Council	Summary of key drainage issues in Harrogate Borough
Craven District Council	Information about flooding hotspots.
North Yorkshire Fire and Rescue Service	The NYFRS provided a spreadsheet of data outlining over 4000 incidents between July 1997 and March 2009. These were geo referenced and mapped at a strategic scale with other historical data. These represent incidents where the Fire and Rescue Services were called out such as pumping out of flooded property and roads.
Internal Drainage Boards	Anecdotal information about flooding of mainly rural areas.

This information indicates that flooding has happened in many of the settlements and rural locations across the SFRA area and this is discussed in the following chapter.

4 Flood Risk in North West Yorkshire

4.1 Introduction

There is a need to understand the risk of flooding from all sources in North West Yorkshire, to consider where the most at risk locations are, and to plan future development and regeneration accordingly.

This section assesses flood risk in North West Yorkshire from all sources, now and in the future with the aim of providing enough information for Harrogate, Craven and Richmondshire Councils to perform the Sequential Test. It makes use of all the data and historical flooding information described in Section 3.5

Three major rivers rise in Craven District. In the western part of the district the River Wenning and River Greta flow west to the River Lune. The River Ribble flows south through Settle and Hellifield. The Rivers Aire and Wharfe both rise in the Yorkshire Dales National Park flowing south east through Craven District. The Aire flows through Skipton and Sutton-in-Craven. The area around the Wharfe is mainly rural in Craven District.

The Wharfe also forms the southern boundary of Harrogate Borough, flowing west towards Wetherby. The River Nidd rises in the western part of Harrogate Borough flowing through smaller towns such as Pateley Bridge until reaching Knaresborough. The River Ure also flows through Harrogate Borough passing through Ripon and Boroughbridge. The Nidd and Ure both join the River Ouse on the eastern boundary of Harrogate District.

The River Ure rises in the Yorkshire Dales National Park and is mainly rural through Richmondshire. The River Swale also rises in the National Park flowing east through the town of Richmond. The headwaters of the River Tees are in Richmondshire and flows to the east through rural areas. See Figure 1-1 for Main Rivers in each council area.

These rivers and their tributaries flow between local authority areas and activities can affect downstream river flow. It is unlikely that land use change in the study area will have a significant impact on flow. Land use change close to smaller watercourses could have a local impact on river flows and significantly influence flood risk.

This highlights the need for the Councils and the Environment Agency to work together on flooding problems, particularly where actions could exacerbate flooding in downstream communities. Managing the network of tributaries is also important, as they could also increase flooding problems in downstream areas.

4.2 Historical Flooding

Sources of historical flood information were summarised in Table 3-4 and are provided for the SFRA area on maps Set G. The information provided gives an overview of parts of the SFRA area where flooding has been observed and recorded in the past and can be used to confirm that modelled outlines of fluvial flooding is reasonable and to identify areas where there has been flooding from other sources.

The historic Flood Event Outlines provided by the Environment Agency show flooding has occurred in the following locations:

- Extensive flooding in rural areas particularly the River Wharfe and River Ure/ Ouse on the boundary of Harrogate Borough, the Lower Nidd, the River Aire near Skipton, the Swale downstream of Richmond.
- Flooding of River Crimple south of Harrogate
- Flooding from the River Ure on the eastern side of Ripon
- River Ribble in north Settle
- River Swale on the northern edge of Catterick
- Skeeby Beck at Gilling West
- The River Tees around Croft on Tees

Harrogate BC have also indicated flooding from smaller watercourses and Oak Beck generally occurs in gardens rather than property.

River modelling studies often include an overview of observed flooding in the study area and flooding from rivers is discussed in more detail in section 4.3 below. Some modelling reports note that in some settlements historic flood events have been made worse by structures in the river. Examples include culverts on Eller and Waller Hill Becks in Skipton and blockage of the high bridge in Masham contributing to flooding of property from Swinney Beck.

In rural areas Claro IDB identified a key flood risk area between Staveley and Boroughbridge with flooding from the River Tutt into the Staveley Carrs area. There is no flooding of property in their IDB area but they identified Markington (just outside the IDB area) as known to be at risk of flooding. Airedale and Marston Moor IDB identified the River Aire as the main source of flooding in Airedale with much more fragmented sources in the Marston area. They confirmed that the Environment Agency Flood Map provides a reasonable representation of flooding in their area.

North Yorkshire Fire and Rescue Service (NYFRS) are called out during flood events to pump out flooded property and roads. Incidents will include flooding from watercourses but also includes flooding from other sources (such as sewers and drains or surface water) and can indicate areas where this is a source of flood risk. Incidents in the SFRA area are generally concentrated in the larger settlements but there are also scattered incidents in smaller villages and rural areas. Harrogate, Ripon, Knaresborough, Pateley Bridge, Skipton, Glusburn and Sutton in Craven, Settle, Low and High Bentham, Leyburn and Middleton show concentrations of incidents to which the fire and rescue service have responded.

Observed flooding from surface water has been reported in the SFRA area, contributing to flooding in Skipton (flow from Skipton Moor) and in Masham (flow from Swinney Beck down Fearby Road).

NYCC provided some information relating to flooding of highways in Harrogate Borough and Richmondshire District. Such flooding can result in the closure of some of these highways. Major highways flooded in Harrogate Borough include areas along the A61, mainly between Harrogate and Ripon, the A6108 at Ripon and near Masham, and also along the A6055 from Knaresborough through to Boroughbridge. In Richmondshire District, the A684 is subject to flooding west of Wensley. Much of this flooding is a consequence of fluvial flooding from nearby Main Rivers.

This section is based on information about observed flooding and should be used in combination with the more comprehensive information such as the Flood Zones to give a full overview of flood risk in NW Yorkshire.

4.3 Fluvial Flood Risk

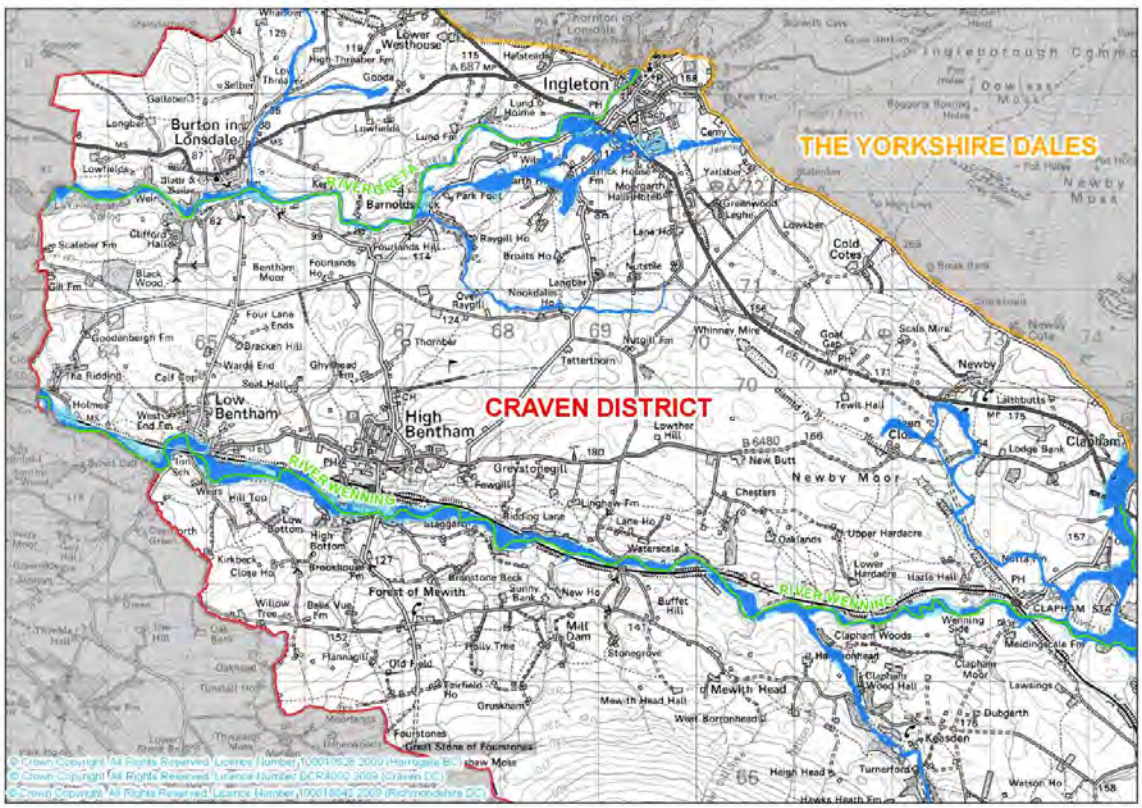
The SFRA area contains both inland designated main rivers and ordinary watercourses. Ordinary watercourses are those that are not designated as Main River and therefore come under the control of the local authority, who have Permissive Power to carry out works should this be deemed necessary.

The following section describes flood risk associated with major rivers in the SFRA area and their tributaries. This information is drawn from a number of available sources of information including the Flood Zone Maps, river modelling studies and historical flood information.

4.3.1 River Wenning and River Greta

The River Wenning and River Greta rise on the south western edge of the Yorkshire Dales National Park. They flow west through the edge of Craven District, joining the River Lune outside the SFRA area. The River Greta catchment to the point where it leaves the SFRA area is 94km^2 (in Craven District and the Yorkshire Dales National Park (YDNP)) and flows through communities of Burton-in-Lonsdale and Ingleton. The River Wenning catchment is 135km^2 (again in Craven District and the YDNP) and the Wenning flows through Low Bentham and Bentham Bridge. A detailed river modelling study has been carried out in Low and High Bentham (Lune 2 Tributaries, JBA Consulting October 2004). This identifies 22 properties at risk in High Bentham and 56 properties in Low Bentham at risk of flooding in a 1% flood event. In Low Bentham flood risk is increased due to the potential for build up of debris at river crossings.

Figure 4-1: River Wenning and River Greta in Craven District



4.3.2 River Ribble

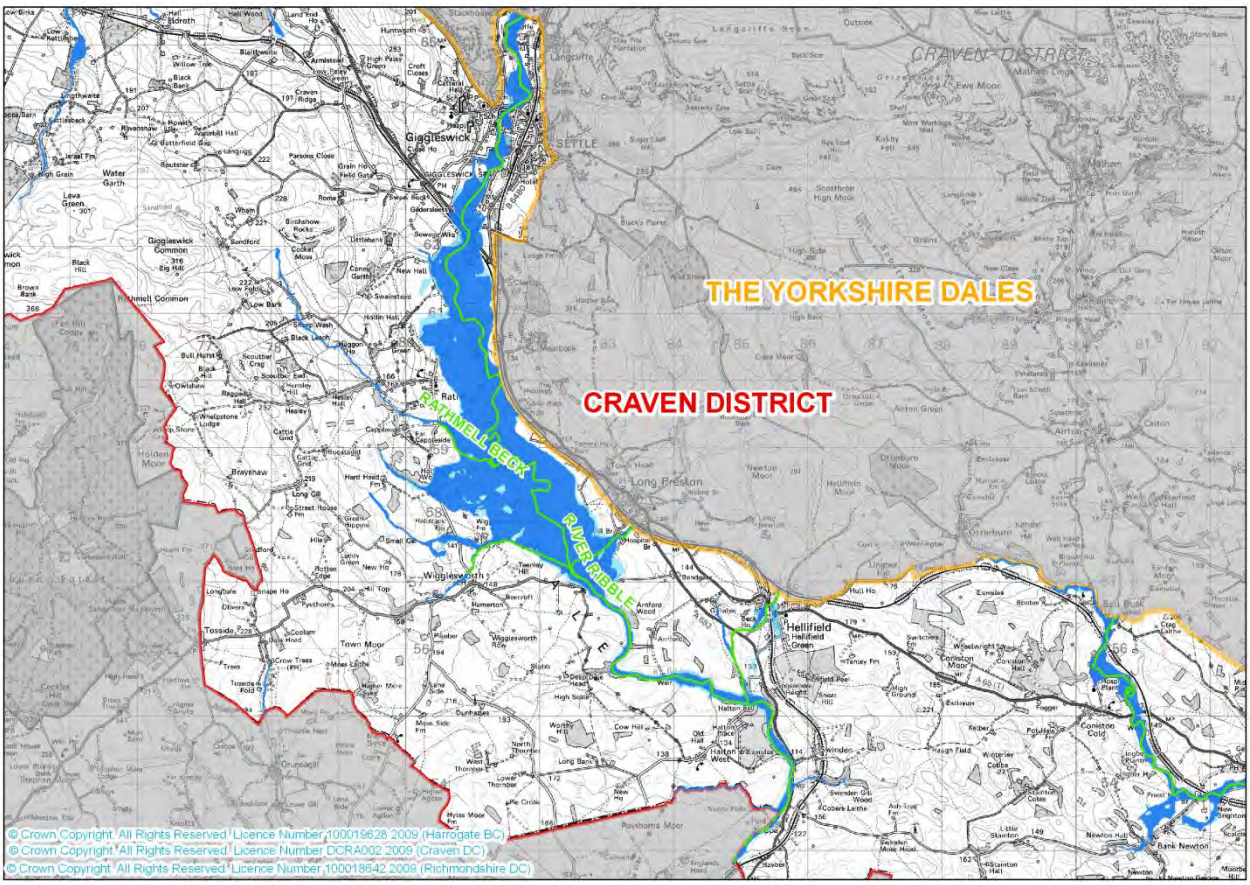
The River Ribble catchment to Hellifield (where it leaves the SFRA area) is 215km^2 and includes part of Craven District and the YDNP. The Ribble rises at Horton in Ribblesdale in the Yorkshire Dales National Park, enters the SFRA area just north of Settle then flows south through Settle and rural areas. The Ribble has significant floodplains in the Craven area including an extensive area near to Long Preston. Flood risk from the Ribble includes property in Settle and rural areas.

Detailed river modelling studies have also been carried out in Settle (Settle and Low Moor Flood Mapping Study, JBA Consulting 2006).

Settle is at risk of flooding from the River Ribble. The Settle and Low Moor study describes a recent event in 1999 with flooding of a mill at Settle Bridge, Bridge End Flats and Langcliffe Road. The 2006 modelling study derived peak flows in the river, which were used to produce flood outlines for a range of flood events between 20% and 1% probability. A 1% flood event with an increase of 20% in peak flow was also created to represent the impact of climate change.

- The study identified 205 properties in Settle at risk of flooding in a 1% event (this is equivalent to Flood Zone 3).

Figure 4-2: River Ribble in Craven District



4.3.3 River Aire

The River Aire rises in the Yorkshire Dales National Park, enters the Craven District near Gargrave and flows south east through Skipton. The Aire and its main tributaries in the study area have a catchment area of 327km2 to Crosshills, this includes parts of the YDNP. On entering Craven District the Aire flows through a number of communities, however the main risk is to agricultural land in the rural floodplain.

The extent of the floodplain is largest where the Aire is joined by tributaries including Eshton Beck and Ings Beck. In Skipton Eller/ Embsay Beck and Waller Hill Beck join in the town centre. There is a history of flooding from these two becks and the Flood Zones in this area are around 100m wide. These becks join the Aire on the south western edge of Skipton, whilst the western edge of the Flood Zones between Skipton and Cononley are constrained by the railway line. The main flood risk from the Aire and its tributaries is in Skipton and in agricultural areas.

Skipton lies on the confluence of Eller Beck and Waller Hill Beck upstream of their confluence with the River Aire. Flooding from Eller Beck and Waller Hill Beck has affected Skipton with the earliest recorded flood in 1908. A modelling study of Eller Beck and Waller Hill Beck was carried out by Atkins in 2000 to produce a flood map of the area. An ISIS model was used to derive peak river levels which were used to produce outlines for a range of flood events between 20% and 1% probability. Flooding in Skipton from the River Aire was recorded in 1980. Key points:

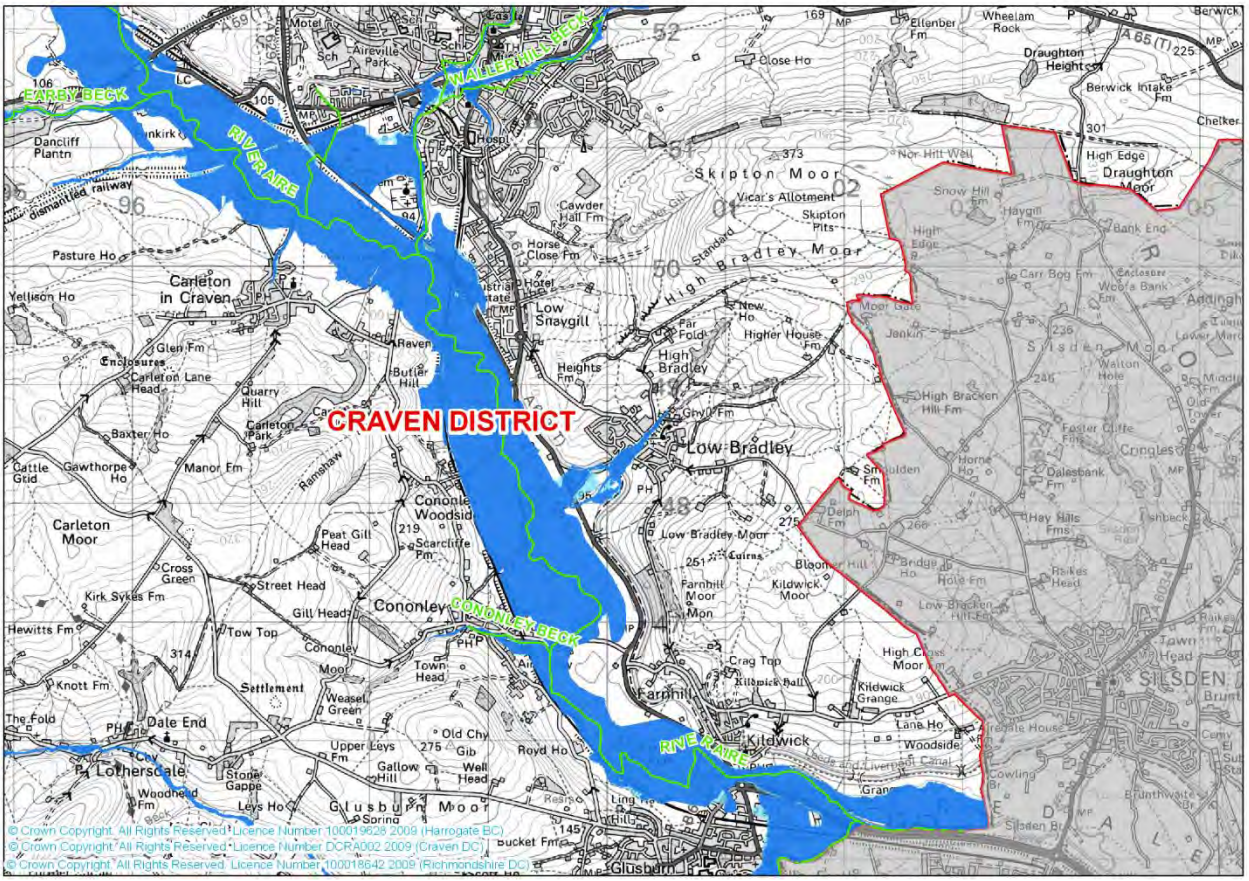
- Skipton has a history of flooding from Eller Beck, Waller Hill Beck and the River Aire.
- There are a number of significant hydraulic restrictions which can lead to flooding along its length including a culvert at Morrisons supermarket in the town centre.

Glusburn Beck flows into the Aire on the eastern edge of Craven District. Glusburn Beck and its tributaries Sutton Beck and Long Dike flow through Sutton-in-Craven. A flood risk mapping study of Glusburn Beck was undertaken by the Environment Agency in 2007 which identified the Beck as having a history of flooding including more recently in August 2004 where 140 properties were flooded. The study also identified flooding from the Ash Grove Sewer as a problem in the area, this is a complex culvert system and flooding was modelled from manholes and undersized sewer inlets.

The mapping study used ISIS and TUFLOW to model the river network and Infoworks to model the Ash Grove sewer, a complicated culvert system running beneath the Ash Grove area and it discharges to Sutton Beck. The models provided estimates of peak river levels and these were used to produce extents for a range of flood sizes events between 20% and 1% probability. Key issues are:

- Glusburn Beck floods in Glusburn, 140 properties flooded in 2004.
- Flooding also occurs in Sutton-in-Craven associated with Ash Grove Sewer.

Figure 4-3: River Aire in Craven District



4.3.4 River Wharfe

The River Wharfe forms the southern boundary of Harrogate Borough. The Wharfe has wide floodplains, notably at the confluence with the Washburn. These are mainly rural in Harrogate Borough and there are no proposed development sites in these areas. The southern bank of the Wharfe includes settlements such as Otley and Ilkley and action taken in Harrogate Borough must avoid increasing flood risk outside of the borough.

4.3.5 River Nidd

The River Nidd rises on Great Whernside in the Eastern part of Harrogate Borough and flows south east through Pateley Bridge, Birstwith, Hampsthwaite, Harrogate and Knaresborough. The headwaters are impounded by Angram and Scar House reservoirs and the river is also impounded in Gouthwaite Reservoir just upstream of Pateley Bridge. The floodplain of the Nidd is generally between 100m and 500m wide. South west of Knaresborough the river meanders through a wider rural floodplain before joining the River Ouse on the edge of Harrogate Borough. Its catchment to the point where it joins the River Ouse is 982 km^2. Key communities at risk of flooding from the Nidd are Pateley Bridge, Birstwith, Hampsthwaite and Knaresborough. Parts of Harrogate are also at risk of flooding from Oak Beck and Cow Dyke Beck which join the Nidd just north of Harrogate.

Knaresborough has a history of flooding from the River Nidd, the earliest recorded flooding was in 1767. More recently an industrial estate, Knaresborough STW and caravan sites were flooded in Autumn 2000. Two modelling studies have been carried out on the Nidd in Knaresborough. In 2003 Babtie, Brown and Root and JBA Consulting carried out a prefeasibility study investigating the potential for improving flood risk management in Knaresborough. In 2006 this was updated by JBA consulting following an improvement to the rating at Hunsingore Gauging Station. A HECRAS model was used to produce data to map flood outlines for a range of flood events between 20% and 0.1% probability and a 1% event with an increase of 20% in peak flow to represent climate change. Key points are:

- Earliest recorded flooding in Knaresborough was in 1767.
- In Autumn 2000 an industrial estate, Knaresborough STW and caravan sites were flooded.
- St James Business Park and Manse Lane Industrial Estate are at risk of flooding. Recent work at St James Business Park created a lowered area adjacent to the Nidd, which has effectively provided a storage area that could reduce levels affecting adjacent development, including the caravan site.

Pateley Bridge is also at risk of flooding, detailed modelling is not available for the town but the Flood Zones (see Figure 4-4) extend across a significant area of the town. There are some defences in place which protect property in smaller flood events.

A flood risk mapping study has also been carried out on Thornton Beck, through the village of Shaw Mills where 13 properties were identified at risk of flooding in a 1% event (equivalent to Flood Zone 3).

Figure 4-4: River Nidd at Pateley Bridge in Harrogate Borough

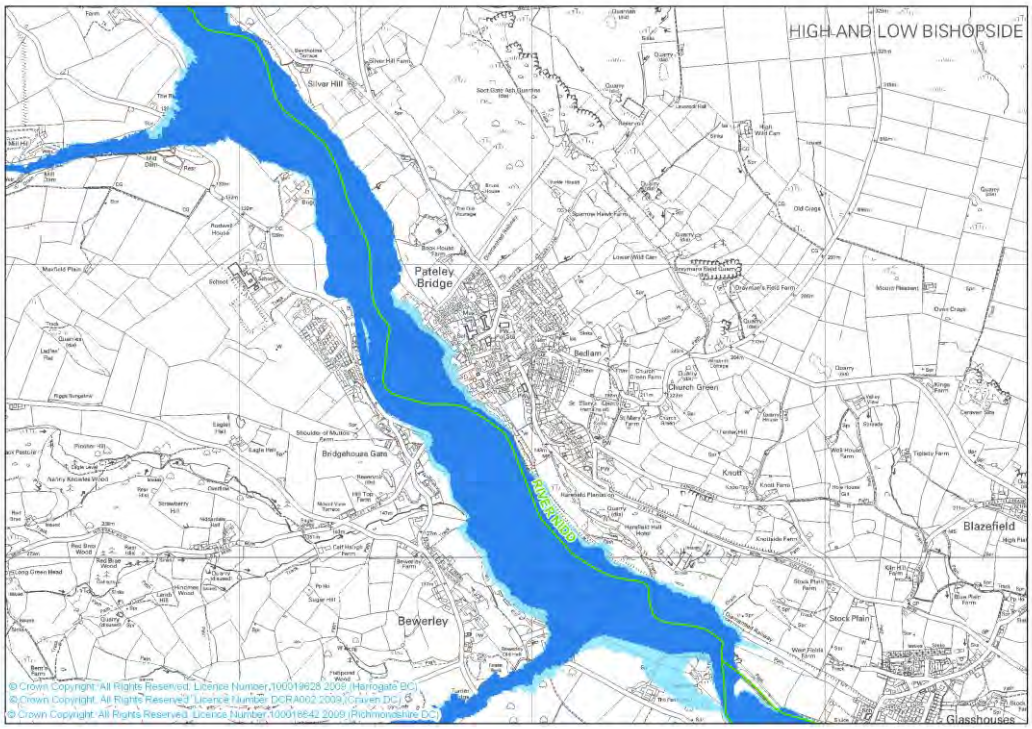
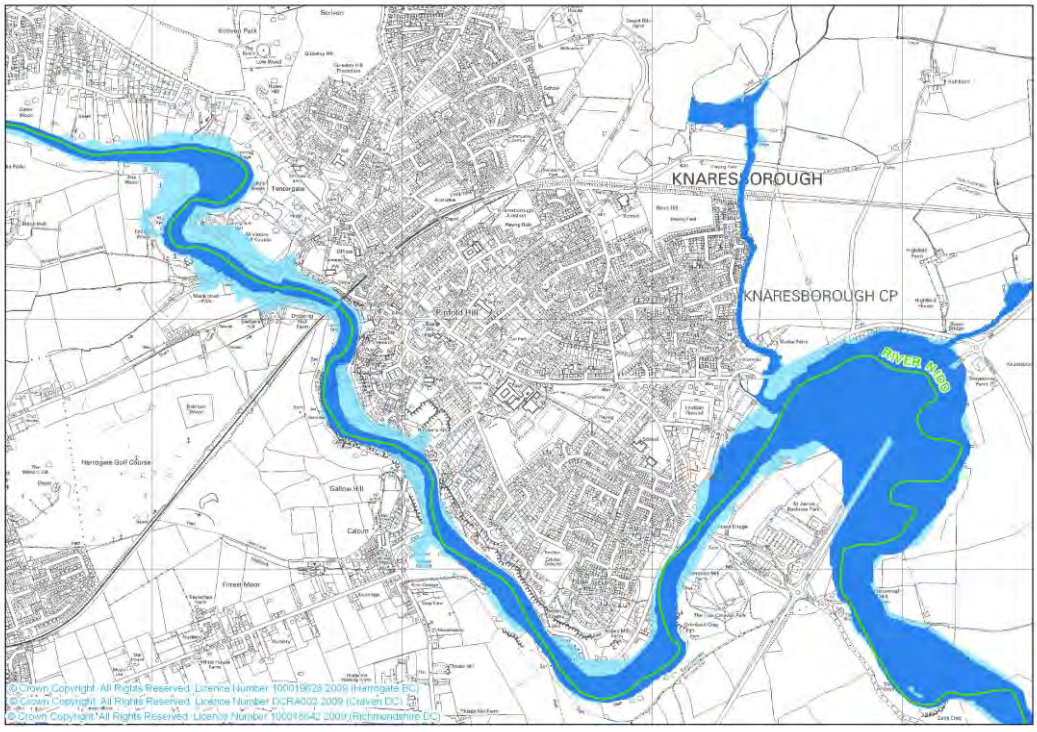


Figure 4-5: River Nidd at Knaresborough in Harrogate Borough



4.3.6 River Ure

The River Ure rises in the Yorkshire Dales National Park and flows east and south through Richmondshire District and Harrogate Borough. Through Richmondshire the river flows mainly through rural areas with natural floodplains which are more then 500m wide. Downstream of Masham the River Ure is joined by Swinney Beck which is at risk of fluvial flooding. The north eastern edge of Masham may also be at risk of flooding from the River Ure as it is at a lower elevation than the rest of the village. The River Ure continues in a south easterly direction towards Ripon where the wide floodplain (greater then 500m) includes built up areas on the east side of the town. The River Skell and River Laver also join the Ure at Ripon and there is flood risk in the town associated with these tributaries. The River Ure continues south west to Boroughbridge where the River Tutt joins the Ure. In Boroughbridge there is a risk of flooding from both the River Ure and the River Tutt, both producing wide flood extents east of the town. There is no modelling study available for Boroughbridge but the Flood Zones are extensive in the area (see Figure 4-8). The River Ure is joined by the River Swale forming the eastern boundary of Harrogate Borough. The catchment of the Ure to its confluence with the Swale is 982km^2, this is mainly in Richmondshire District and Harrogate Borough.

Ripon has a history of flooding from the Rivers Ure, Skell and Laver, with recent events including 1991, 1995 and 2000. Two modelling studies have been carried along the River Skell, River Laver and River Ure within Ripon. In 2004, Halcrow carried out river modelling as part of a feasibility study for a flood alleviation scheme in Ripon. The study used ISIS and Infoworks RS to model the 3 rivers. Key points from the study are:

- Flow on the River Skell is complicated by water management upstream at Fountains Abbey and Studley Water Park where flow is diverted into the ponds and canals that make up the formal water gardens.
- Blockage of Wood Bridge contributed to flooding in November 2000.
- In 1991 there was flooding of homes, caravan park, racecourse and roads. Canal and River were described as joining to form a large lake.

Flood Risk Mapping studies have also been carried out on tributaries of the Ure in the villages of Masham (Swinney Beck), Markington (Markington Beck) and Bishop Monkton (Bishop Monkton Beck). These villages have flooded in the past. Flood outlines were produced for each village for a range of flood events between 20% and 0.1% probability. A 1% event with an increase of 20% in peak flow was also produced to represent climate change.

Figure 4-6: River Ure and Swinney Beck at Masham in Harrogate Borough

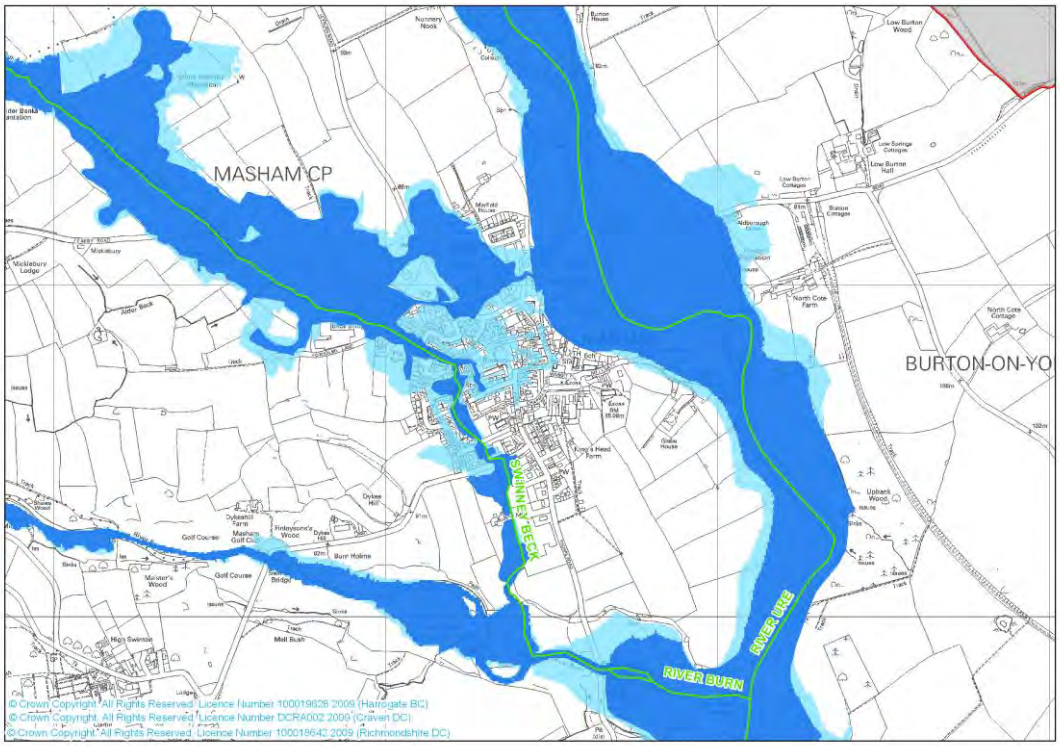


Figure 4-7: River Ure and River Skell at Ripon in Harrogate Borough

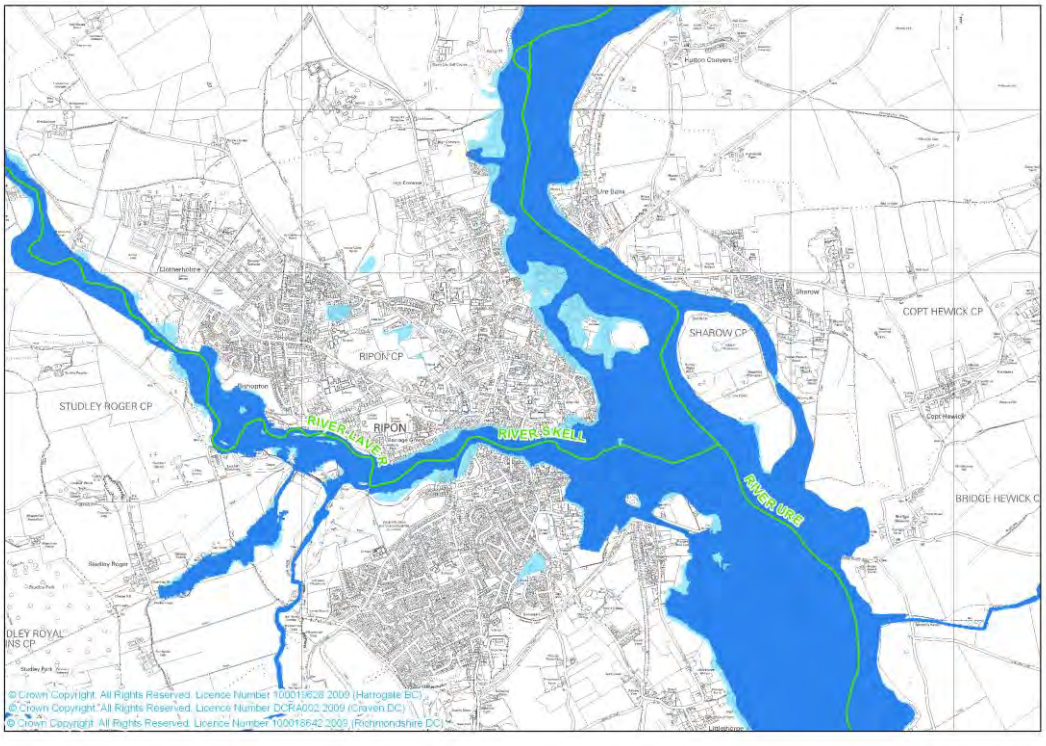
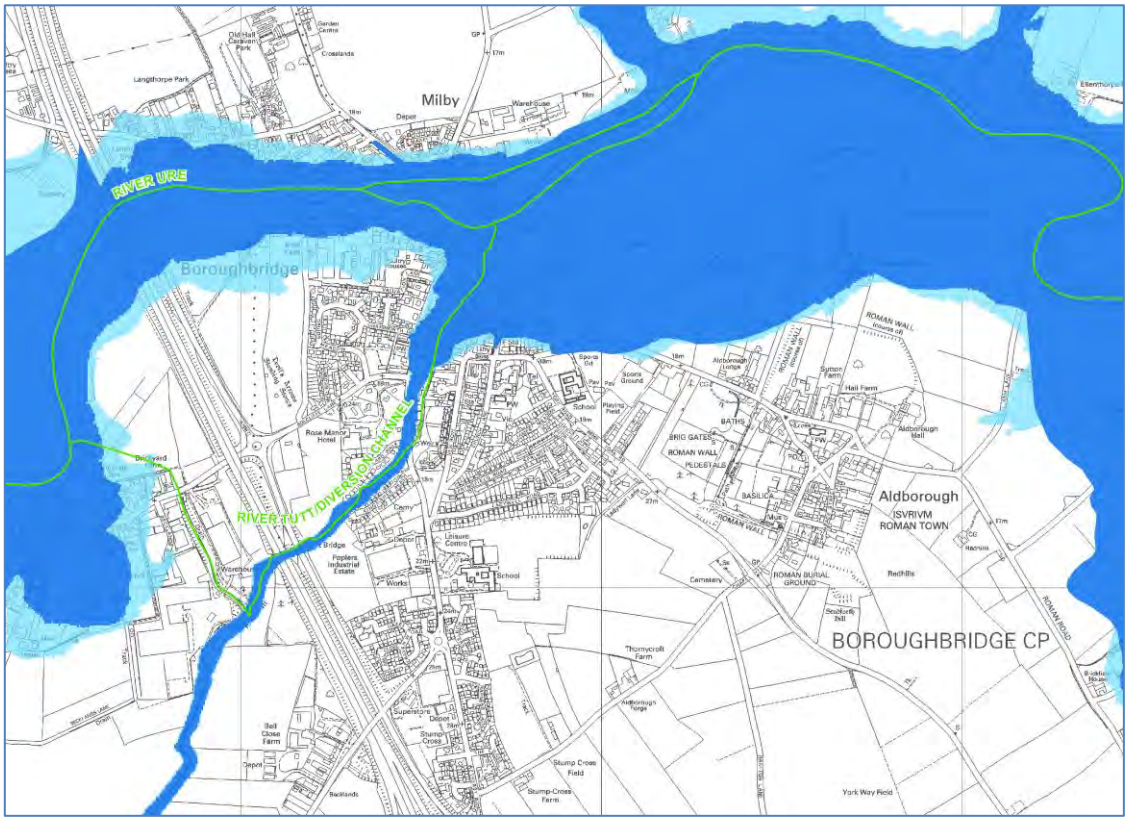


Figure 4-8: River Ure at Boroughbridge in Harrogate Borough



4.3.7 River Swale

The River Swale rises in the Yorkshire Dales National Park and enters Richmondshire District upstream of the town of Richmond. Downstream of Richmond floodplains widen to include Catterick which is also at risk of flooding from Brough Beck. The Swale then flows out of the SFRA area rejoining it 16km further south east to form the western boundary of Harrogate District south of Skipton on Swale.

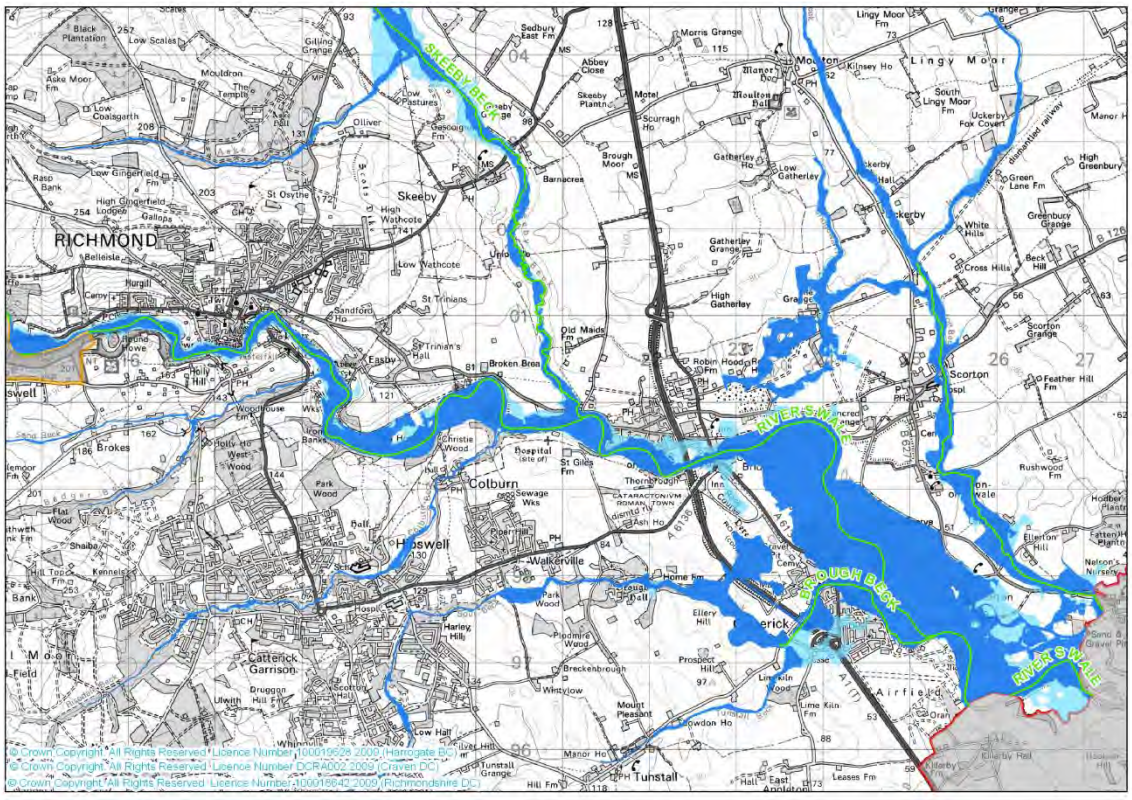
Brough Beck (known locally as Sour Beck) flows through Catterick Village and Catterick Garrison Area. JBA consulting carried out a study in 2008 to identify trigger levels for flood warning areas in Catterick Village and to improve Flood Zone extents for the Environment Agency. HECRAS and JFLOW models were used to produce flood outlines for a range of flood events between 20% and 0.1% probability. A 1% event with an increase of 20% in peak flow was also produced to represent climate change. Flood warning areas in Catterick Village, proposed in an earlier study have been accepted and new trigger levels proposed. Key results are:

- Properties in Catterick Village are at risk of flooding from a range of flood events

There is a history of flooding in the village of Gilling West with properties at risk adjacent to and downstream of Gilling Bridge. In 2006 Halcrow carried out a modelling study on Gilling Beck to improve flood risk maps. An ISIS model was used to produce data to map flood outlines for a range of flood sizes between 20% and 0.1% probability and a 1% event with an increase of 20% in peak flow to represent climate change. Key results are:

- 40 properties are at risk of flooding in Gilling West during the 1% probability event. This includes 17 properties which are homes for elderly people.

Figure 4-9: The River Swale in Richmondshire



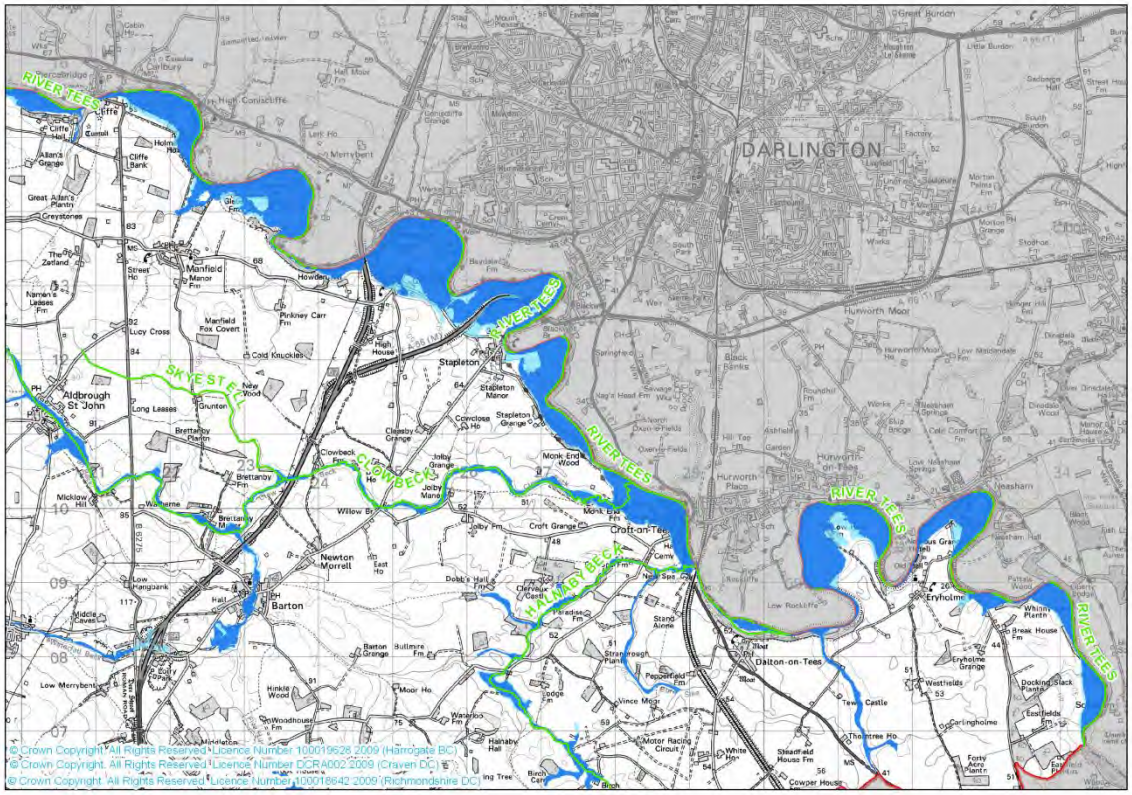
4.3.8 River Tees

The most northerly river in the SFRA area is the River Tees which forms the northern boundary of Richmondshire. Its tributary Clow Beck flows east though Richmondshire joining the Tees near Croft on Tees. Properties are at risk of flooding in Croft on Tees whilst Cleasby meadows act as washlands during a flood event. Defences at Cleasby are reported as having a 1 in 50 SoP but there may be some bypass flow from the river.

The River Tees study was carried out by JBA Consulting in 2008 for the Environment Agency for assessing flood risk, investigating rural defences and assessing flood warning. The River Tees forms the north eastern boundary of Richmondshire and the upper part of the modelling study included Croft on Tees and Cleasby. An ISIS model of the river was produced and flood outlines developed for a range of flood sizes between 20% and 0.1% probability. The flood outline for a 1% event with a 20% increase in peak flows to allow for climate change was also assessed. Relevant results for the SFRA are:

- Properties are at risk of flooding in Croft on Tees during a 1% event.
- Cleasby meadows act as washlands during flood events

Figure 4-10: The River Tees in Richmondshire



4.4 Flooding from Land

The Environment Agency National Surface Water Flooding Map was used in an initial assessment of surface water flooding in the level 1 SFRA. These maps are held by the Local Authority and not provided as part of the SFRA.

The national map typically shows steeper areas as less vulnerable to surface water flooding, for example smaller catchments and the edge of the natural floodplain of larger rivers. Floodplains and low lying greenfield areas are generally more vulnerable to surface water flooding. The National Surface Water Flooding Maps show risk of flooding in many areas of land outside Flood Zone 3, and this needs to be considered as an integral part of the assessment of overall flood risk. This information is used with records of historical flooding to indicate flood risk areas outside the Flood Zones, and this risk will be partly due to surface water.

The National Surface Water Flooding Map provides a broad scale analysis of surface water risk. Refined surface water mapping giving a more accurate a detailed picture of the risk was carried out for areas in Harrogate Borough and Craven District. This was done for areas where the National Surface Water Map identifies significant risk and taking account of the number of properties potentially affected. (see section 5.6 for further information). Richmondshire District Council did not request detailed surface water mapping during the level 1 SFRA.

Figure 4-11: Detailed Surface Water Mapping Areas

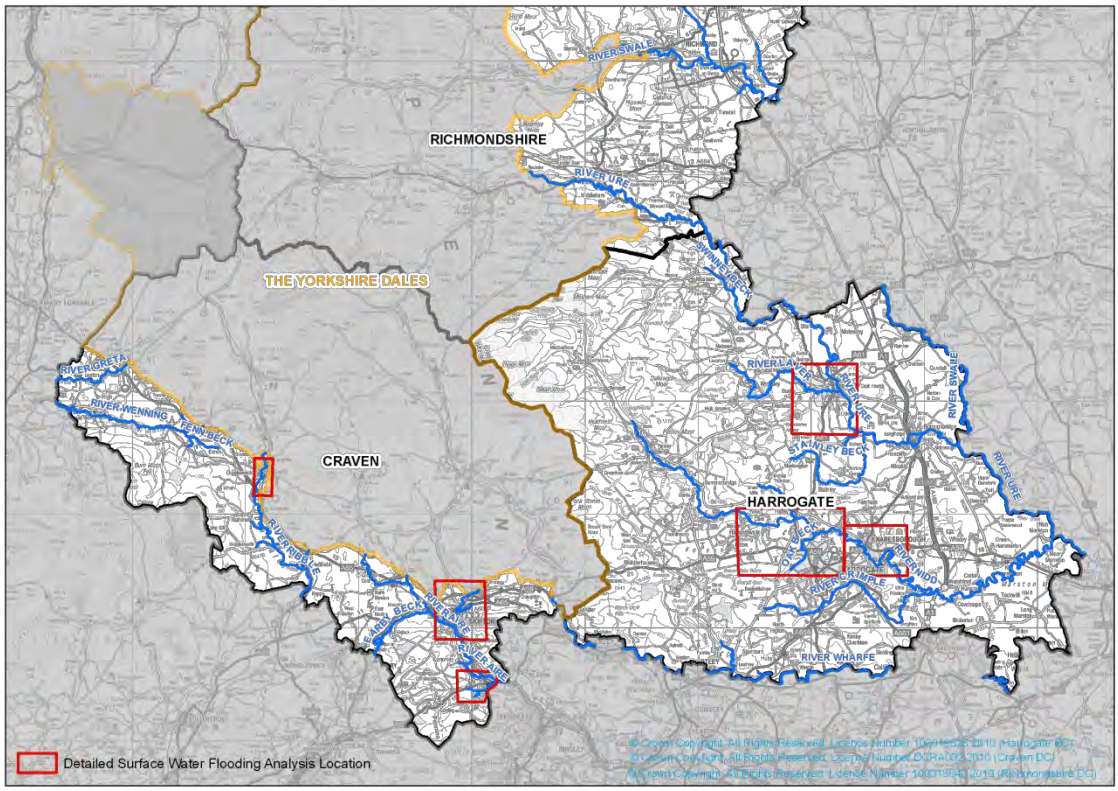


Table 4-1: Detailed Surface Water Flood Risk Mapping	
Harrogate Borough	**Craven District**
Harrogate (Central and NE areas)	Skipton
Knaresborough	Settle
Ripon	Sutton in Craven

These areas should form the basis of discussions between the councils, the Environment Agency and Yorkshire water to agree locations for Critical Drainage Areas (CDAs).

The next sections discuss areas outside Flood Zone 3 which are vulnerable to surface water flooding based on the refined surface water flooding analysis. Note that the detailed analysis does not cover the entire SFRA area.

4.4.1 Harrogate Borough

The following table outlines areas where the detailed surface water flood mapping or the flood hotspots information indicates a risk of surface water flooding in areas outside the Flood Zones. These have been compared with information about flooding from sewers provided by Yorkshire Water (see section 4.5 below) to identify places where surface water drainage from developments might add to flood risk from sewers and drains.

Table 4-2: Harrogate Borough - Areas at Risk of Surface Water Flooding		
Settlement	**Area at Risk of Surface Water Flooding**	**Is there any evidence of flooding from sewers and drains?**
Harrogate	Crescent Road in Low Harrogate, the north western side of the A61 around the Exhibition Halls and around Plompton off Hookstone Chase	Yes - record from Yorkshire Water
	Knox Bridge Area	Greenfield area - surface water management should be considered during design of any development
Kanaresborough	Small area on Nidderdale Drive	None recorded
	Small area in Calcutt	None recorded
	Land to the NE of the town	Greenfield area - surface water management should be considered during design of any development
Ripon	Back gardens on Primrose Drive	None recorded
	Land at Gallows Hill and off Quarry Moor Lane	None recorded

See maps Set F H1-3 for current surface water flood vulnerability, maps Set F H4-6 for future changes in vulnerability and also see Set F H7-9 for a comparison between medium vulnerable areas now and in the future.

4.4.2 Craven District

Craven District Councils has provided information about known flooding hotspots. Most of these are related to flooding from rivers and occasionally road drainage. The following table outlines areas where either the detailed surface water flood mapping or the flood hotspots information indicates a risk of surface water flooding in areas outside the Flood Zones. These have been compared with information about flooding from sewers provided by Yorkshire Water (see section 4.5 below) to identify places where surface water drainage from developments might add to flood risk from sewers and drains.

Table 4-3: Craven District - Areas at Risk of Surface Water Flooding

Settlement	Area at Risk of Surface Water Flooding	Is there any evidence of flooding from sewers and drains?
Skipton	Gawflat Bridge	No flooding from sewers recorded in areas at risk of surface water flooding. Craven District Council have identified flooding hotspots (some outside the Flood Zones) but these are related to fluvial flooding.
	Belmont Street, Cavendish Street, Craven Street and Moorview Road	
Settle	Agricultural land to the south of Ingfield Lane and land at Caterall Hall	Greenfield areas - surface water management should be considered during design of any development.
	Raynes Rd - Giggleswick	Craven District Council flood hotspot has been linked to road drainage.
Sutton in Craven	Highly vulnerable areas also in Flood Zone 3	None recorded

See maps Set F C1-3 for current surface water flood vulnerability, maps Set F C4-6 for future changes in vulnerability and also see Set F C7-9 for a comparison between medium vulnerable areas now and in the future.

4.4.3 Richmondshire

Richmondshire District Council did not request refined surface water mapping analysis for the Level 1 SFRA. The National Surface Water Flooding map indicates that most areas at risk of surface water flooding in Richmondshire are in the Flood Zones and also at risk of flooding from rivers.

Scotton and Tunstall have been identified as areas where there are problems with surface water flooding (during an LDF working group). We do not have any other detailed information about the risk of surface water flooding in Richmondshire.

4.5 Flooding from Sewers

Yorkshire Water have provided information from their DG5 register. This summarises the number of properties at risk of either internal or external flooding from sewers. These are scattered across the SFRA area, with concentrations in the Harrogate area and in Skipton. At Yorkshire Water's request these have not been mapped in the SFRA but information has been used to inform the critical drainage areas.

Yorkshire Water's website outlines their current work to reduce sewer flooding. They are committed to spending £39M to prevent flooding at 386 properties and at 88 outdoor locations across Yorkshire by 2010. Their Final Business Plan (April 2009) proposes an additional £60M spending between 2010 and 2015[9]. It is not known what fraction of their recent spending has addressed sewer flooding problems in the SFRA area.

4.6 Critical Drainage Areas

Critical Drainage Areas (CDAs) are areas where runoff associated with new development might increase flood risk from surface water drainage and/ or sewer capacity. Detailed surface water mapping and information about flooding from sewers have been compared (see sections 4.4 and 4.5) and the following critical drainage areas proposed.

Table 4-4: Proposed Critical Drainage Areas

Local Authority	Area	Reason
Harrogate Borough	Low Harrogate	Risk of surface water flooding and recorded flooding from sewers.
	Knox Bridge (NE Harrogate)	Risk of surface water flooding in greenfield location - careful management of surface runoff from developments will be required
	Knaresborough - Land to the NE of the town	Risk of surface water flooding in greenfield location - careful management of surface runoff from developments will be required.
Craven District	Settle - land at Ingfield Rd and Caterall Hall	Risk of surface water flooding in greenfield location - careful management of surface runoff from developments will be required
	Giggleswick - Raynes Rd	Craven District Council have linked flood hotspot to road drainage
Richmondshire District	None proposed	Few areas at risk of surface water flooding outside Flood Zones. Few sewer flooding incidents recorded.

Proposed Critical Drainage Areas should be investigated in detail in a Level 2 SFRA. This should include confirmation that sewer flooding is still a risk in the area and better

[9] http://www.yorkshirewater.com/about-us/our-investment-plans/final-business-plan.aspx

understanding of local drainage. Proposed CDAs should be agreed between the councils, the Environment Agency and Yorkshire Water/ United Utilities.

4.7 Flooding from Groundwater

Flooding from ground water can happen when ground water levels are high. This may be due to rainfall in the groundwater source area but can also happen on floodplains if river levels are held above the level of the flood plain by embankments. The rivers in the SFRA area have raised defences in some places, however their flood plains are generally small and many of the rivers are quite flashy and elevated water levels decrease quite quickly. This means flooding from raised river levels is less likely.

During initial stakeholder consultation the Environment Agency indicated that they do not consider flooding from groundwater to be a significant issue in the SFRA area.

4.8 Flooding from Reservoirs & other Artificial Sources

The Environment Agency provided a spreadsheet list of reservoirs and grid references. This was used to map reservoir locations in the SFRA area. There are a number of reservoirs both in the SFRA area and upstream in the YDNP area. Most of these are small and located in the headwaters some distance upstream of any settlements.

The following table summarises reservoirs in the SFRA area which are close to settlements and provide a potential source of residual flood risk.

Table 4-5: Reservoirs Located Near to Settlements

Reservoir	Local Authority	Location	Comment
Embsay	Yorkshire Dales National Park (close to the boundary with Craven DC)	On Embsay Beck 1.5 km upstream of Embsay	Embsay Beck is a source of flood risk in Skipton which is approximately 4km downstream of the reservoir
Whinny Gill	Craven DC	Skipton (on eastern side of town)	Raised rectangular reservoir with embankment on NW and NE sides.
Gouthwaite	Harrogate BC	3km upstream of Pateley Bridge	Raised dam across River Nidd

There are other large reservoirs in the SFRA area (notably in Harrogate BC area) which are further upstream of any settlements. Although large reservoirs provide the obvious source of residual risk from artificial sources, there may also be a number of smaller water bodies within the area. These could provide a greater risk as there may be potential ownership issues and these water bodies may not be inspected regularly. These may not have been identified within this SFRA, FRAs should assess the residual risk associated with them if they are located close to a development.

4.9 Flooding from Canals

Canals can be a source of flooding. They can act as pathways to rapidly move volumes of water during a flood event and breach of embankments can lead to flooding downslope from the canal. The Leeds and Liverpool canal runs through rural parts of Craven District and passes through Skipton. The Springs Branch of the canal is a short length in Skipton town

centre. The flood map indicates flooding along the canal in Skipton Town centre and this needs further investigation in a level 2 SFRA.

The Ripon canal is a 2.5 km length of waterway which connects Ripon city centre with the River Ure. Flooding in Ripon around the area of the canal has been observed with the canal and river described as joining to form a large lake[10]. It is not known how much of this flooding was due to the canal.

4.10 Geology & Soils

The soils of North West Yorkshire were investigated using a strategic scale (1:250,000) map available from the National Soil Research Institute and can be viewed at: **http://www.landis.org.uk/soilscapes/**. This map shows that the major river valleys contain freely draining acid soils and elsewhere in the study area the soils are acidic types including blanket peat and other poorly drained upland soils.

The underlying geology of much of Harrogate Borough and Richmondshire District is Millstone Grit. To the west the geology consists of carboniferous limestone including the Yoredale series[11].

Please note that this is based on strategic scale maps therefore it should be used only as an indication of the potential for groundwater and surface water flooding and a generalised dataset for the implementation of source control and infiltration sustainable drainage techniques (SuDS)

Geology and soils should be investigated at a site level during a FRA. Their characteristics are not the only considerations when designing SuDS. It is recommended that the application of SuDS should be explored at an early stage of new development projects and design requirements documents within any FRA produced.

More detail on the application of SUDS and the SuDS “Management Train” is also provided in Volume I, Appendix H.

[10] The Environment Agency, Ripon Flood Alleviation scheme Modelling Study, 2004, Halcrow
[11] IGS, 1971. British Regional Geology, Northern England, 4th Ed, HMSO London

4.11 Effects of Climate Change

UK Climate Impact Programme 02 (UKCIP02) scenarios suggest that winters will become wetter over the whole of England, by as much as 20% by the 2050s. A shift in the seasonal pattern of rainfall is also expected, with summers and autumn becoming much drier than at present. Snowfall amounts will decrease significantly throughout the UK, but the number of rain-days and the average intensity of rainfall are expected to increase.

Rainfall intensity and the increase in the number of rain-days could have significant implications for surface water flooding and should be considered when designing drainage systems for new developments.

Peak flow increase by around 20% from 2025 (see table below) will translate into higher water levels. In North West Yorkshire, the climate change outlines produced from the hydraulic modelling studies show that the extent of flooding may not increase significantly along most of the watercourses where climate change outlines are available. For the areas where climate change outlines are not available, the difference between Flood Zone 3 and 2 (shown on maps Set A) can act as an indicator as to what the climate change outlines may be assuming that Flood Zone 2 could potentially become Flood Zone 3 in the future.

The hazard to people associated with higher depths and velocities will however increase as highlighted by Table B.2 below, extracted from PPS25.

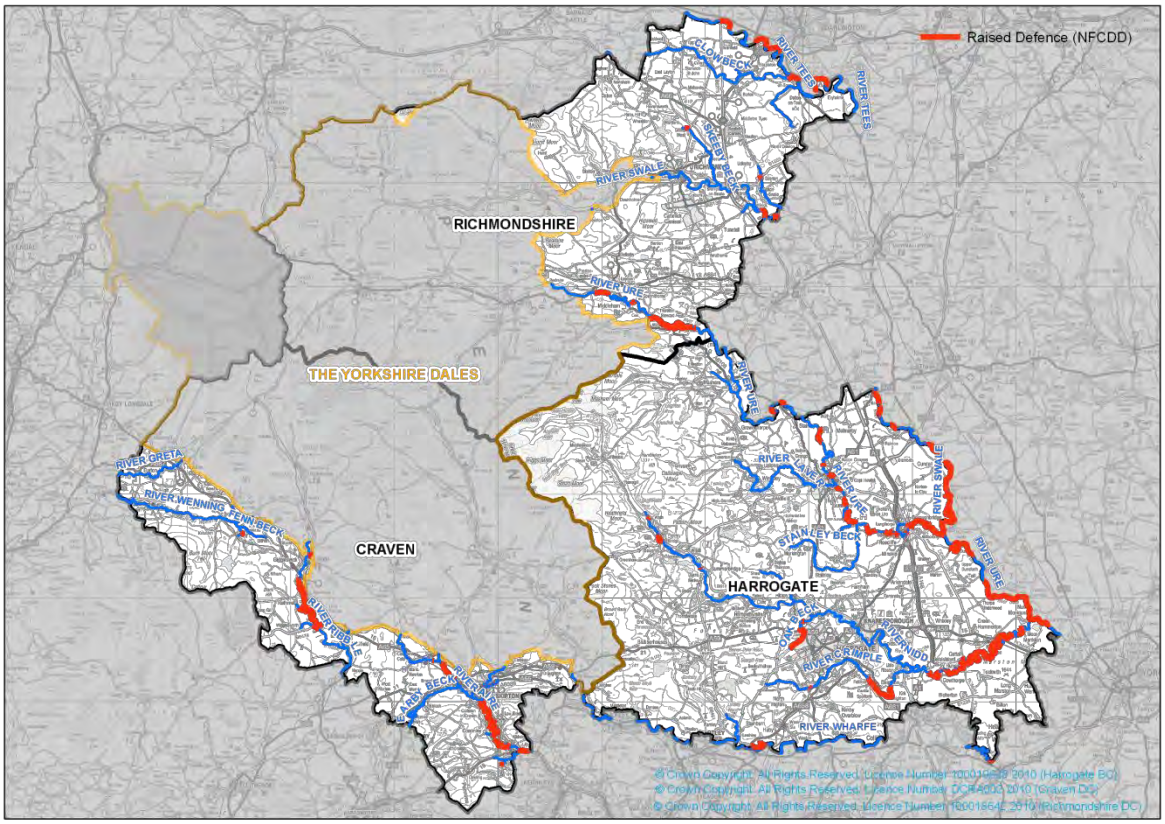
Table B.2 Recommended national precautionary sensitivity ranges for peak rainfall intensities, peak river flows, offshore wind speeds and wave heights.

Parameter	1990 to 2025	2025 to 2055	2055 to 2085	2085 to 2115
Peak rainfall intensity	+5%	+10%	+20%	+30%
Peak river flow	+10%	+20%		
Offshore wind speed	+5%		+10%	
Extreme wave height	+5%		+10%	

4.12 Flood Defences

The Environment Agency maintains records of all flood risk management assets using the National Flood and Coastal Defence Database (NFCDD) and this has been made available for this SFRA. Map Set E shows the location of flood defences and, where known, Areas Benefitting from Defences (ABD).

Figure 4-12: Flood Defence Locations



According to the database there are a number of raised defences within North West Yorkshire. Each defended area is summarised by council region in the next few sub-sections.

4.12.1 Harrogate Borough

Raised man-made defences exist at Beningbrough, Newton-on-Ouse and Linton-on-Ouse along the banks of the River Ouse. These defences are designed to protect properties downstream during a major flood event. Most of these defences are designed to overtop into controlled washlands during flood events.

There are many raised defences along the River Ure, including a natural raised defence protecting properties at Lower Dunsforth. Man-made raised defences exist also at Lower Dunsforth and further upstream around Boroughbridge, Newby, Ripon and West Tanfield. Several of these defences also operate as overtopping banks for flood water to enter controlled washlands during flood events.

Heading upstream along the River Swale there are several raised man-made defences that are designed to overtop into controlled washland areas. These are located around Humberton, Treble Sykes Farm and Cundall. Further raised man-made defences exist near North Rainton and Baldersby. At Myton-on-Swale there are crossbanks designed to check flows towards the Ure catchment area during major flood events.

Many raised man-made defences are in place along the River Nidd between Walshford upstream to Moor Monkton downstream. These consist of overtopping floodbanks that direct water into controlled washlands in order to protect downstream properties. The same type of defence exists along the River Crimple around Spofforth. At Pateley Bridge along the River Nidd there are man-made defences in place to protect properties and a caravan park. Further upstream on the Nidd at Wath is a raised defence designed to protect livestock. This defence only provides protection at the start of a flood event, standard of protection of defences is not known.

An area of high ground is in place along Oak Beck at Jennyfields in Harrogate is considered to be a natural raised defence protecting the golf course and a large number of properties.

On the River Wharfe there is a man-made raised defence upstream of Castley. This defence protects properties and farms. Further downstream, just north of Tadcaster, is an overtopping floodbank for flood waters to enter a controlled washland during a major flood event.

4.12.2 Craven District

From Carleton Bridge, south of Skipton, downstream to Cononley there are a number of raised man-made defences on both banks of the River Aire. These defences mainly consist of flood embankments and spillways protecting properties in south Skipton, Carleton-in-Craven and Cononley. There are further man-made defences downstream at Farnhill and Kildwick and upstream of Skipton towards Gargrave. There are raised embankments on either bank of the River Ribble south of the sewage works at Settle. Approximately just south of The Riddings downstream to the confluence with Long Preston Beck, the defences are to be abandoned. These defences will not be repaired as they do not protect any properties. The same is true about the small defence on Rathmell Beck.

Several other smaller raised man-made defences exist to help protect areas along Langcliffe Road in Settle from the River Ribble flood waters, along Kettles Beck to at Lanshaw Farm and in Ingleton along the River Greta at Bank Bottom Road.

4.12.3 Richmondshire District

Downstream of Ulshaw on the River Ure are several raised man-made defences on both banks of the river. These defences are designed to overtop into controlled washlands which helps protect properties further downstream in Ripon and Boroughbridge. Two floodbanks also exist to help protect arable land at Woodhouse Farm and Kilgram. Further upstream at Wensley, a floodbank is designed to overtop and direct flood water to a washland to help protect properties downstream.

Along the River Swale there are two earth embankments at Kirkby Fleetham and Ellerton-on-Swale designed to provide protection to property and arable land.

At Scorton there is a raised man-made floodbank designed to protect properties in Scorton from Scorton Beck flood waters.

There are several raised man-made defences along the River Tees protecting arable land and properties at Cliffe and Cleasby, the A66 road north of Stapleton, arable land and properties at Monk End and Croft-on-Tees and arable land around Low Hail.

4.12.4 Flood Defence Condition and Standard of Protection (SoP)

It should be noted that the condition of the defences described in the previous section was not provided in the NFCDD dataset we received. Also missing was the SoP value.

4.13 Flood Warning Areas (FWAs)

Flood Warning Areas are covered by Floodline Warnings Direct. There are a number of Flood Warning and Flood Watch Areas that cover North West Yorkshire, some of which cross over the administrative boundaries applicable to the SFRA. The following sub-sections list the FWAs located completely or partly within each council area. We were not provided with any information regarding number of properties covered. See maps Set E for FWAs. We do not have information to map most of the FWAs in Craven District, a list was provided in the Local Flood Warning Plan for Craven District Council[12].

4.13.1 Harrogate Borough

1. 122FWFDW236 - River Swale at Thornton Bridge
2. 122FWFDW305 - River Ure at Masham
3. 122FWFDW306 - Swinney Beck at Masham
4. 122FWFDW307 - Bishop Monkton Beck at Bishop Monkton
5. 122FWFDW310 - River Ure at Roecliffe Caravan Park
6. 122FWFDW312 - River Ure at Ure Bank in Ripon
7. 122FWFDS315 - River Skell - Barefoot Street to Alma Weir in Ripon
8. 122FWFDW318 - River Ure at Fisher Green to the racecourse in Ripon
9. 122FWFDW320 - River Skell, upstream of Borrage Bridge in Ripon
10. 122FWFDW340 - River Ure at Bar Lane Roecliffe
11. 122FWFDW344 - River Ure at Langthorpe
12. 122FWFDW345 - River Ure at Boroughbridge
13. 122FWFDW346 - River Ure at Aldwark Bridge
14. 122FWFDW347 - River Tutt at Boroughbridge
15. 122FWFDW352 - River Ure at Lower Dunsforth
16. 122FWFDW404 - River Nidd at Pateley Bridge
17. 122FWFDW405 - River Nidd at Knaresborough
18. 122FWFDW406 - River Nidd at Hunsingore and Cattal
19. 122FWFDW407 - River Nidd at Knaresborough Caravan Parks
20. 122FWFDW524 - River Wharfe at Burley in Wharfedale
21. 122FWFDW560 - River Wharfe at Otley
22. 122FWFDW570 - River Wharfe at Castley Lane
23. 122FWFDW573 - River Wharfe at Harewood Bridge

4.13.2 Craven District

1. 122FWFDW520 - River Wharfe at Bolton Bridge
2. 012FWFY1- River Ribble at Settle
3. 012FWFY2 - River Wenning at High Bentham
4. 123FWFRW101 - River Aire at Gargrave (Mill Lane and Airebank Mills)
5. 123FWFRW094 - River Aire at Gragrave
6. 123FWFRW193 - Broughton Beck at Elslack
7. 123FWFRW194 - Broughton Beck at Broughton Business Park
8. 123FWFRW102 - River Aire at Ings Lane, Skipton
9. 123FWFRW103 - Eller Beck at Sandylands Skipton

[12] The Environment Agency, Local Flood Warning Plan for Craven District Council, rev 2.1, August 2008.

10. 123FWFRS104 - Eller Beck at Skipton (Belmont St, Belmont Wharfe and Brewery Lane)
11. 123FWFRS090 - Eller Beck at Skipton from upstream of Mill Bridge to downstream of Brewery Lane Bridge
12. 123FWFRW105 - Eller Beck at Carleton Business Park
13. 123FWFRW106 - River Aire at Snaygill Industrial Estate
14. 123FWFRW107 - River Aire at Cononley Business Park
15. 123FWFRW108 - River Aire at Skipton Rd Kildwick
16. 123FWFRW109 - River Aire at Crosshills
17. 123FWFRW093 - River Aire at Airedale Trading Park
18. 123FWFRW110 - Eastburn Beck at Glusburn

4.13.3 Richmondshire District

1. 122FWFDW210 - River Swale Caravan Parks at Richmond
2. 122FWFDW211 - Gilling Beck at Gilling West
3. 122FWFDW220 - River Swale at Brompton-on-Swale caravan park
4. 122FWFDW222 - River Swale at Richmond
5. 122FWFDW228 - River Swale at Catterick Bridge
6. 122FWFDW229 - River Swale at Catterick Village
7. 122FWFDW250 - Brough Beck at Catterick
8. 122FWFDS251 - Severe Flood Warning for Brough Beck at Catterick
9. 122FWFDS252 - Severe Flood Warning for Brough Beck at Catterick Village
10. 122FWFDS253 - Severe Flood Warning for Brough Beck at High Street, Kings Close and Mowbray Road, Catterick

5 Strategic Flood Risk Mapping

5.1 Introduction

The investigation and identification of the extent and level of flood risk to an area is mostly assessed geographically. The Environment Agency"s Flood Maps are very useful, showing indicative land use planning zones as required by PPS25, they are a starting point when considering flood risk in a particular area.

PPS25 Flood Zone Maps have two key functions.

- To enable the Sequential Test to be carried out, firstly in avoiding inappropriate development and then secondly, to seek compatibility between flood risk vulnerability and Flood Zones as required in Table D3 of PPS25.
- To influence the spatial decisions made in Core Strategies and other DPS and to identify areas where more detailed flood risk management policies are required.

However, more detailed analysis is often needed to gain a greater understanding of the varying degree of flood risk at a district level.

At a Level 1 SFRA, it is not appropriate to look at flood risk in detail for individual development allocations, as this is a requirement of a Level 2 SFRA and a site specific FRA which will be undertaken by developers in respect of specific development proposal and prior to submitting a planning application.

However, there is a need to undertake a broad assessment of flood risk issues to assist the LPA in making the spatial planning decisions required. This will enable a degree of certainty that the proposed development allocations put forward in the LDD, allow compliance with the Sequential and Exception Tests in PPS25 and importantly provide information to test whether the developments should be safe for occupants and users.

This broad assessment is assisted greatly by the use of “Strategic Flood Risk Maps” produced in the Level 1 SFRA to convey information on flood risk factors needing to be taken into account. These maps have been produced as a complementary suite of Council scale flood risk information and include the PPS25 Flood Zone Maps. No one map should be considered in isolation without reference to the others.

The set of Strategic Flood Risk Maps provided in the North West Yorkshire Level 1 SFRA Update include:

Maps	Title	Reference
Set A	PPS25 Flood Zones	H1-26, C1-10, R1-13
Set B	1 in 100 Year Flood Depths	H1-46, C1-6, R1-23
Set C	1 in 100 Year Flood Hazards	H1-46, C1-6, R1-23
Set D	Climate Change Sensitivity	H1-9, C1-4, R1-3
Set E	Flood Risk Management	H1-19, C1-6, R1-7
Set F	Refined Surface Water Flooding	H1-9, C1-9
Set G	Historical Flooding	H1-4, C1-2, R1-3

After the PPS25 Flood Zone Map has been used to carry out the first sweep of the Sequential Test for various proposed development locations, all sets of maps need to be interpreted consistently in order to complete the second or third pass of the sequential approach sieving process.

The detail provided in the Strategic Flood Risk Maps may also facilitate the application of the Exception Test where applicable. These maps should be used in sequence as shown in the Sequential Test sieving process in Volume I of the SFRA.

5.2 Set A: PPS25 Flood Zones Maps

The PPS25 Flood Zones maps cover Harrogate Borough, Craven District and Richmondshire District, and are largely based on information provided in the Environment Agency Flood Map. Version 3.14 of the Environment Agency Flood Zones issued in June 2009 has been used as the latest Flood Zones for the SFRA, whilst the Functional Floodplain has been delineated using the method outlined in section 5.2.1. The PPS25 Flood Zone Maps illustrate:

- Main Rivers
- Detailed River Networks - Ordinary Watercourses
- Flood Zone 2
- Flood Zone 3a
- Flood Zone 3b (Functional Floodplain)
- Candidate Flood Zone 3b
- Harrogate Borough SHLAA Sites (August 2009)
- Craven District SHELAA Sites (outside of the Yorkshire Dales National Park)
- Richmondshire District SHELAA Sites (outside of the Yorkshire Dales National Park)

These key maps should be used to facilitate the undertaking of the Sequential Test by planners and developers according to PPS25, as discussed previously in Volume I and illustrated within stage 1 of the Sequential Test sieving process.

The further suite of Strategic Flood Risk Maps discussed below should be used to support the PPS25 Flood Zone Maps in Sequential Testing as a second or third pass of the sieving process. They will also be useful when applying the Exception Test especially when considering other sources of flood risk and assessing whether the development site would be safe now and in the future.

5.2.1 Functional Floodplain

Functional Floodplain is land where water has to flow or be stored during a flood. PPS25 calls this Flood Zone 3b. For the North West Yorkshire SFRA Flood Zone 3b has been defined as the area which floods in an event with a 1 in 25 chance of occurring in any year. Developed areas are excluded from the Functional Floodplain (even if they are at risk in 1 in 25 event) as water is not currently able to flow freely during a flood.

Flood Zone 3b - NW Yorkshire SFRA

A consistent method was used to produce Flood Zone 3b for the NW Yorkshire SFRA.

- Initially defined using modelled 1 in 25 year flood outlines in areas where there have been detailed modelling studies (see section 3.4).
- Flood zone 3b was extended to include land which provides a function for flood conveyance or flood storage such as washlands. Information was supplied by the Environment Agency and extends flood zone 3b to some areas where there are no detailed modelling studies.
- Areas benefitting from defences (ABDs) were removed using the ABD data from the EA
- Developed (Brownfield) land was removed from Flood Zone 3b
- Major transport infrastructure (e.g. motorways and railways) was removed from 3b
- Removal of „dry islands" defined using the „size standards" within the Environment Agency SFRM Specification for Flood Risk Mapping[13]
- Inclusion of a river centreline, extracted from OS MasterMap data.

[13] Environment Agency (2006) Strategic Flood Risk Management Specification for Flood Risk Mapping release 1.2

It has been acknowledged by the Environment Agency, that there are some inaccuracies in Flood Zone 3 on minor watercourses, in particular non-main rivers due to scale and misalignment issues. As it is critical that the outline for the Functional Floodplain is as accurate as possible, non-main rivers should be excluded unless modelled outlines are available. It has also been stated by Jonathan Boyes at the Environment Agency that Flood Zone 3, in some areas where modelled outlines have been used to create Flood Zone 3b, is inaccurate and is due to be updated in the next version of the National Flood Map. In these instances, Flood Zone 3b is seen to slightly extend beyond Flood Zone 3 in some places.

The approach used to define the Functional Floodplain for each watercourse is summarised in Table 5-1.

Table 5-1: Functional Floodplain (Flood Zone 3b) Mapping

Watercourse	Extent	Data Source
All Main Rivers	River centreline	OS MasterMap
River Ure	Fluvial 1 in 25 year outline	Ripon Data Improvements (2008)
River Laver	Fluvial 1 in 25 year outline	Ripon Data Improvements (2008)
River Skell	Fluvial 1 in 25 year outline	Ripon Data Improvements (2008)
River Nidd	Fluvial 1 in 25 year outline	Nidd Model Update (2006)
River Nidd	Fluvial 1 in 25 year outline	Nidd, Knaresborough (2003)
Bishop Monkton Beck	Fluvial 1 in 25 year outline	Bishop Monkton Beck Flood Mapping Study (2006)
Markington Beck	Fluvial 1 in 25 year outline	Markington Beck SFRM Study (2009)
Swinney Beck	Fluvial 1 in 25 year outline	Dales Area Floodplain Mapping Phase 2 Studies (2005)
River Wharfe	Fluvial 1 in 25 year outline	River Wharfe Flood Risk Mapping Update (2009)
Gilling Beck	Fluvial 1 in 25 year outline	Gilling Beck Flood Mapping (2006)
Swinney Beck	Fluvial 1 in 25 year outline	Dales Area Floodplain Mapping Phase 2 Studies (2005)
Eller Beck	Fluvial 1 in 25 year outline	Eller Beck Section 105 Studies (2000)
Glusburn Beck	Fluvial 1 in 25 year outline	Glusburn Beck SFRM (2008)
River Aire	Fluvial 1 in 25 year outline	Upper Aire Strategy (2005)
River Wenning	Fluvial 1 in 25 year outline	Lune 2 Tributaries Flood Risk Mapping Study (2006)
River Ribble	Fluvial 1 in 25 year outline	Settle and Low Moor Flood Mapping Study (2006)
River Tees	Fluvial 1 in 25 year outline	River Tees Model Update Phase 2 (2008)
River Crimple	Washland	EA Washland – taken from original SFRA FZ3b outline
River Nidd	Washland	EA Washland – taken from original SFRA FZ3b outline

Watercourse	Extent	Data Source
River Ouse	Washland	EA Washland – taken from original SFRA FZ3b outline
River Swale	Washland	EA Washland – taken from original SFRA FZ3b outline
River Ure	Washland	EA Washland – taken from original SFRA FZ3b outline
River Wharfe	Washland	EA Washland – taken from original SFRA FZ3b outline

Candidate Flood Zone 3b - NW West Yorkshire SFRA

Detailed modelling studies and/or Environment Agency Washlands information is not available for all main rivers. In these places there may still be functional floodplain (land which is used for water to flow or be stored during a flood) however a detailed Flood Zone 3b outline cannot be produced using existing information.

In these areas a proposed extension (candidate) Flood Zone 3b has been identified as:

- Undeveloped (greenfield) land currently at risk of flooding in a 1 in 100 event

Candidate 3b flood plain identifies Greenfield areas within Flood Zone 3a and the SFRA recommends that these are safeguarded from future development to protect their role during a flood event.

These areas have not been explicitly modelled and are partly based on professional judgement, and it is therefore important that they are assessed in more detail at a site-specific FRA level if development is proposed in the future. This SFRA recommends that they are left as open Greenfield for future flood storage or compensation needed for development in other areas.

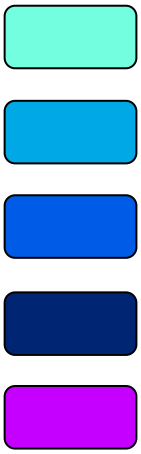
5.3 Sets B and C: Indicative Flood Zone 3 Depth & Hazard Map

Indicative depth data of a 1 in 100 year event has been provided for Harrogate Borough, Richmondshire District and the southern area of Craven District. The depth grid was obtained from the Environment Agency North East Broad Scale modelling work for CFMPs undertaken by JBA Consulting in 2008. Parts of Craven fall in the Ribble, Calder, Lune and Wyre hydrometric areas which are in the Environment Agency North West region and data is not available.

The North East Broad Scale Modelling was based on the methodology used in creating the original Environment Agency Flood Map using the overland routing model JFLOW. This was improved by:

- Updating the hydrology of inflows into the model, and
- Updating the topographical data from NextMap to LIDAR data. Flow paths under structures were also included to provide a more realistic result.

The extent of the depth grid cannot be directly compared to the current Flood Zones in North West Yorkshire, they do provide a useful indication of potential scale of flood inundation during a 1 in 100 year event. The depth map has been categorised in depth ranges using the scaling below:



An indicative hazard map was also created using the same outputs from the Environment Agency work. This shows potential hazards using the Environment Agency flood hazard formula as proposed in Phase 2 of the Risks to People Project[14]

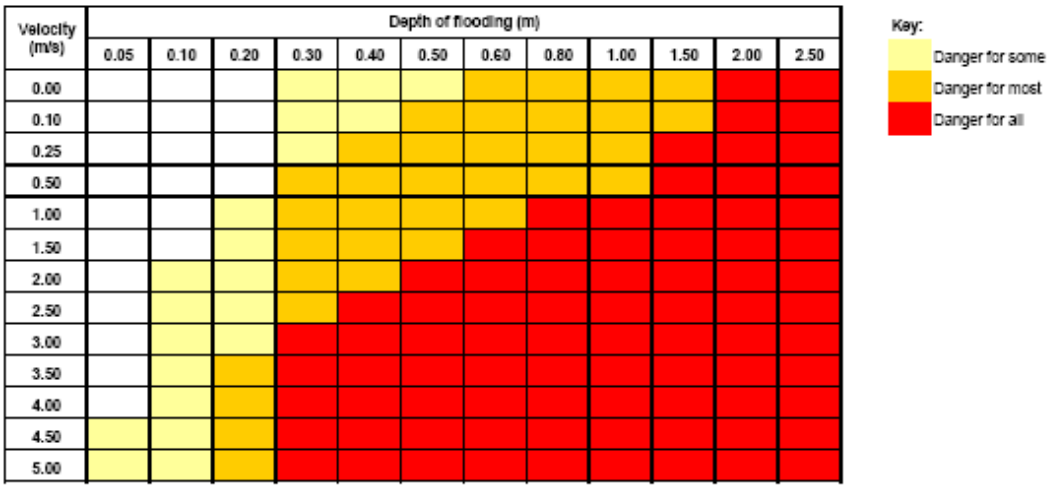
$$\text{Flood hazard} = d\,(v+0.5) + DF$$

Where d is the depth (m), v is the velocity (m/s) and DF is the debris factor. Recommended values for the debris factor are 0.5 if depth is less than 0.25m and 1.0 if depth is greater than 0.25m[13]. Figure 5-1 illustrates the link between depth and velocity and their associated danger. Full details about this method and research can be found at **http://www.hydres.co.uk/**.

[14] FD 2320 Flood Risk Assessment Guidance for New Development Phase 2 Defra/EA Flood & Coastal Defence R&D Programme TR2 (Technical Report 2), October 2005. (Available from http://www.hydres.co.uk/)

Figure 5-1: Danger to People from Depth and Velocity (table 13.1 from FD 2320 Flood Risk Assessment Guidance for New Development Phase 2 Defra/EA Flood & Coastal Defence R&D Programme TR2 (Technical Report 2), October 2005)[13]

Table 13.1 Danger to people for different combinations of depth and velocity



The depth grid created has been categorised and coloured in accordance to current guidance as described in Table 5-2 below. Depths below 0.25m and velocities below 0.5m/s are considered to be low hazard[13].

Table 5-2: Flood Hazard Rating

Flood Hazard Rating	Hazard to People	Colouring
0	No Hazard	
0 to 0.75	Very low hazard	
0.75 to 1.25	Dangerous for some - includes children the elderly and the infirm	
1.25 to 2.0	Dangerous for most - includes general public	
Over 2.0	Dangerous for all - includes emergency services	

These indicative maps are helpful in supporting the PPS25 Flood Zone Maps during the Sequential Test, especially during the Sequential Test sieving process. The hazard maps provide an early indication that a development could be safe during times of flood as hazard is a relationship between depth and velocity. The depth maps could help during the master planning and sequential layout of a development by placing developments of a higher vulnerability in areas of shallower flood depths.

However, it must be remembered that the indicative depth and hazard data is merely an indication of possible depths and hazard from a 1 in 100 year flood. The PPS25 maps (Set A) should always be viewed before, or in conjunction with, the depth and hazard maps as the PPS25 Flood Zones take precedence.

5.4 Set D: Climate Change Sensitivity Maps

Climate change sensitivity maps show modelled fluvial flood extents from Main Rivers, for an undefended floodplain with a 1% (1:100 year) flood flow plus a 20% increase in flood flows. This is a standard method for assessing how flood risk might change as flood flows increase in the future. Section 4.11 outlines recommendations for how rainfall and river flow may change in the future. These future extents can be compared with the current 1% outlines from the same models to see where Flood Zone 3 may change in the future as a result of climate change. This identifies areas where flood risk may increase in the future.

Table 5-3 summarises where climate change extents are available from detailed hydraulic models.

Table 5-3: Climate Change Extents

Watercourse	Extent	Data Source
River Wharfe	Fluvial 1 in 100 year + 20% outline	River Wharfe Flood Risk Mapping Update (2009)
River Nidd	Fluvial 1 in 100 year + 20% outline	Nidd Model Update (2006)
Bishop Monkton Beck	Fluvial 1 in 100 year + 20% outline	Bishop Monkton Beck Flood Mapping Study (2006)
River Ure	Fluvial 1 in 100 year + 20% outline	Ripon Data Improvements (2008)
River Laver	Fluvial 1 in 100 year + 20% outline	Ripon Data Improvements (2008)
River Skell	Fluvial 1 in 100 year + 20% outline	Ripon Data Improvements (2008)
Markington Beck	Fluvial 1 in 100 year + 20% outline	Markington Beck SFRM Study (2009)
River Aire	Fluvial 1 in 100 year + 20% outline	Upper Aire Strategy (2005)
River Wenning	Fluvial 1 in 100 year + 20% outline	Lune 2 Tributaries Flood Risk Mapping Study (2006)
Gilling Beck	Fluvial 1 in 100 year + 20% outline	Gilling Beck Flood Mapping (2006)
River Tees	Fluvial 1 in 100 year + 20% outline	River Tees Model Update Phase 2 (2008)

For un-modelled watercourses elsewhere in the SFRA area the presumption is that Flood Zone 2 provides a precautionary extent of Flood Zone 3a in the future.

The sequential approach requires early consideration of the effects of climate change on flood risk and these maps help greatly in this respect.

PPS25 requires the consideration of the sensitivity of new developments to climate change to be considered as part of an appropriate FRA and these maps provide an indication of this sensitivity. In addition emergency evacuation routes can be identified and planning put in place to ensure they are outside of the flood extent.

The sensitivity of a particular location and land use to climate change can be factored into decisions regarding floor levels, building uses and safe access and egress etc. Greater changes in climate change extents can be associated with greater increases in flood risk, and in these areas, where this risk cannot be avoided or substituted, mitigation measures are likely to be extensive. For some developments, the FRA may not be able to demonstrate continued safety for occupants as required by the Exception Test in PPS25.

5.5 Set E: Flood Risk Management Measures Maps

Residual risks are the risks that remain after all risk avoidance, substitution and mitigation measures have been taken. The residual risks in North West Yorkshire are therefore related to the occurrence of events of low probability, such as extreme flood events greater than the design capacity of the constrained river system or where the design standard of these flood defences is exceeded.

A map of flood risk management measures has been produced for North West Yorkshire. The map includes the:

- Location of Environment Agency raised flood defences
- Coverage of Areas Benefitting from Defences
- Coverage of Environment Agency Flood Warning Areas

This map is very important when considering the residual risks associated with flooding. These residual risks must be investigated within any Level 2 SFRA or site-specific FRA as relevant.

5.6 Set F: Detailed Surface Water Flood Modelling and Maps

Due to the high level nature of the National Areas Susceptible to Surface Water Flooding Maps developed by the EA, more detailed surface water maps were produced as part of this SFRA commission. The more detailed maps were produced using the following methodology:

The 2D modelling software JFLOW was used to route rainfall over an elevation mode and is the same base tool used for the national Areas Susceptible to Surface Water Flooding map. However, in this instance;

- The elevation model was modified via MasterMap data to include roads and buildings to help define flow paths;
- The run-off of the surface of the model was varied depending on whether an area was developed or green space, to take into account water being absorbed by the ground surface;
- The rainfall inputs were also modified to make them more specific to the catchments in Craven District and Harrogate Borough than the generic catchment characteristics used to define the National Surface Water Map; and
- The current scenario used an extreme 1 in 200 year rainfall event with a storm duration of 1 hour was chosen, as will be used for the 2nd generation of the National Surface Water Map.
- The future (climate change scenario) assumed a 20% increase in the 1 in 200 year (1 hour duration) rainfall event which is the recommended change for 2055 to 2085 period. It also assumes that sites have been developed (which will locally increase the rate of runoff).

Under such extreme conditions it was assumed that the sewer network would be at capacity, blocked or have failed and so this was not taken into account. This is a conservative approach that indicates what might happen in such an extreme event and clearly picks out surface water flow paths and areas of ponding.

Most new sewers are designed to a 1:30 year design standard and hence sewer flooding problems will often be associated with more frequent storm events when a sewer become blocked or fails. In the larger events that are less frequent but have a higher consequence, surface water will exceed the sewer system and flow across the surface of the land. Hence the surface water modelling and mapping, which is based on an extreme scenario, picks up overland flow paths that would be expected should the sewers surcharge (back up) in most locations.

This is also the case for the more frequent storms when sewers could become blocked and flood at manholes, although flooding would be less extensive depending on the point in the sewer network where the blockage or failure has occurred.

A current and a future scenario were considered. The future scenario takes into account the increased intensity of extreme rainfall predicted by climate change models and increased runoff from new developments on green space. Hence the future scenario provides a conservative and worst case scenario which is considered appropriate for a strategic study. The current and future scenarios are mapped together for the medium risk areas. This map indicates which areas are likely to have a significant increase in surface water flooding in the future.

Considering both sewer and surface water flooding together is considered to be appropriate when taking a strategic view of flood risk in an extreme event from both these sources. More detailed consideration of the mechanisms and locations of sewer flooding is beyond the scope of this SFRA.

5.7 Set G: Historical Flooding

These maps show any historical flooding that has occurred in the council areas. Historical flooding is presented in the form of Flood Event Outlines (FEOs) and flood incident call outs (between June 1997 and March 2009) from the North Yorkshire Fire and Rescue Service. The FRS filtered the data to remove, where possible, incidents which are not relevant to the SFRA (e.g. flooding from plumbing or domestic appliances). Previous highways flooding incidents were provided by NYCC for Harrogate Borough and Richmondshire District but not in a format that could be readily mapped. Craven District Council flood hotspot data has been included on the Historical Flooding maps.

6 Proposed Development Sites

6.1 Introduction

A Level 1 SFRA should enable Harrogate Borough Council, Craven District Council and Richmondshire District Council to carry out the Sequential Test as outlined in Annex D of PPS25 in order to allocate development sites during the Sustainability Appraisal of their LDF and to develop policies for within the LDF.

The North West Yorkshire SFRA covers a large geographical area and there are many potential development sites which are currently subject to assessment by each of the three LPAs. This section of the report summarises the overall picture for each LPA and the following sections provide more detailed site specific information.

- Harrogate Borough - section 7.1 to 7.12
- Craven District - section 8.1 to 8.10
- Richmondshire District - section 9.1 to 9.4

A Sequential Test spreadsheet has been produced showing area (ha and m²) and percentage cover of each site identified by the LPAs against PPS25 Flood Zones and as an extra layer of information against the surface water vulnerability zones. More detailed tables which describe flood risks for each site in flood zone 2 or 3 have also been provided.

6.1.1 Current Development Site Sequential Test

The council's spatial planners and development control should use this information to carry out the first sieve of the Sequential Test. Each council will be required to prioritise the allocation of land for development in order from Flood Risk Zone 1 to 3, including the subdivisions of Flood Risk Zone 3. This enables planners to identify and remove those sites at greatest risk.

Once a decision has been made to remove or keep (due to wider social/economic reasons) those sites at higher risk, they should then carry out a second or third pass of the Sequential Test against the wider suite of Strategic Flood Risk Maps produced within this SFRA. This information should provide a stronger case whether flood risk is acceptable by looking at all sources of flooding or those sites highlighted as higher flood risk in the first instance should actually have been removed.

Surface water flooding poses a risk to development with a number of sites situated in areas susceptible to surface water flooding according to the national Surface Water Flood Maps. Large dense developments could have significant implications on current risk in the area and further downstream if runoff is not controlled. Whilst surface water vulnerability zones are not specifically included within the Sequential Test, it is recommended in this SFRA that the suite of surface water flooding maps produced should be used to carry out a sieving process to development sites identified at risk. Those sites situated on immediate flow paths should be removed or surface water considered during master planning of the site itself. Whilst it maybe considered drastic to remove these sites altogether, surface water flooding should be considered both in the layout of the developments and in the inclusion of SuDs.

The Environment Agency has statutory responsibility and must be consulted on all development applications allocated within medium and high risk zones, including those in areas with critical drainage problems and for any development on land exceeding 1 hectare outside flood risk areas. If the site is in Flood Zone 2, Flood Zone 3 or in a critical drainage area, the Environment Agency will require the council to demonstrate that there are no reasonable alternatives, in lower flood risk categories, available for development.

It is recommended that the Sequential Test process is carried out at a local or community level especially when it comes to identifying and substituting more vulnerable development in

land outside of flood risk areas. By doing this the aim of the Sequential Test can still be achieved as well as each council meeting their own relevant objectives in the RSS or LDF i.e. a local need for affordable housing within a town centre may restrict the area of search to within the regeneration area.

The Exception test must only be applied if there are no reasonably available alternative sites in lower risk areas. If there are alternative sites, the Exception Test should not be applied.

6.1.2 Current Development Site Exception Test

Currently there are a number of proposed development sites situated partially within Flood Zone 3b and 3a, these sites are identified in the sequential test spreadsheet described in the previous section and are shown on maps Set A for each authority.

Proposed allocation sites are scattered across settlements in the three local authority areas. Harrogate Borough Council have considered some of their SHLAA (August 2009) sites in Flood Zones 3a and 3b and indicated that development / regeneration of brownfield sites may be considered in areas of flood risk in Harrogate, Knaresborough, Ripon, Masham, Pateley Bridge, Boroughbridge and in smaller villages with limited options for development. Craven and Richmondshire have not indicated strategic sites but these are likely to focus on their principal and local service centres identified in their Core Strategy (see section 1.3).

It is always recommended that areas designated as Functional Floodplain should be left as open green space and allowed to store water during a flood event. Sites within Flood Zone 3b should therefore be avoided during the Sequential Test and not allocated especially those within the Functional Floodplain. This should be done first before considering the vulnerability of the proposed development and substituting less vulnerable uses. At the last possible stage the Exception Test should be considered. Proposed allocation sites in Flood zone 3a will need to pass the Exception Test.

If these sites are situated within a regeneration area and / or are critical to the wider social and economic sustainability of the community, the Exception Test will need to be applied only once the Sequential Test has been completed. In this case the vulnerability of the proposed development will have to be linked to Table D.2 and Table D.3 of PPS25. A site-specific FRA will be required to pass Part C of the Exception Test.

6.2 Current Development Site Sequential Test

Development sites identified by Harrogate BC include:

- Housing site options
- Employment site options
- Mixed use site options
- The total developable area is around 1,360ha.

Development sites identified by Craven DC include:

- Strategic Housing and Employment Land Availability Assessment (SHELAA)
- The total developable area is around 350ha.

Potential development sites (subject to assessment) identified by Richmondshire DC include:

- Strategic Housing and Employment Land Availability Assessment (SHELAA)
- The total developable area is around 425ha.

Table 6-1 to Table 6-3 and Table 6-4 to Table 6-6 provide a summary of sites at risk of fluvial and surface water flooding that are included in the Sequential Test spreadsheet.

6.2.1 Summary of sites at risk of fluvial flooding

Table 6-1: Summary of Development Sites at Risk of Fluvial Flooding - Harrogate BC

Development Sites	No. Sites	Total Area (ha)	Flood Zone 2		Flood Zone 3a		Flood Zone 3b	
			Area (ha)	No.	Area (ha)	No.	Area (ha)	No.
Allocations	435	1,363.23	30.31	73	47.47	69	3.29	12

- 50.76ha of sites are at risk of flooding in the 1 in 100 year event (Flood Zone 3a+3b)
- Out of 69 sites in Flood Zone 3a on average 24% of each site is at flood risk. This is a high percentage of the sites at risk.
- 81ha of sites are at risk of flooding in the 1 in 1000 year event (Flood Zone 2+3a+3b)
- Out of 73 sites in Flood Zone 2 on average 18% of each site is at flood risk.
- 12 sites are situated in the Functional Floodplain and under PPS25 these will not be permitted. However the total area of sites within Flood Zone 3b is small at 3.29ha though on average 29% of each site is within the Functional Floodplain, and again this represents a high proportion of the sites.

It may be possible to redefine many of these site boundaries to make development acceptable.

Table 6-2: Summary of Development Sites at Risk of Fluvial Flooding - Craven DC

Development Sites	No. Sites	Total Area (ha)	Flood Zone 2		Flood Zone 3a		Flood Zone 3b	
			Area (ha)	No.	Area (ha)	No.	Area (ha)	No.
SHELAA	183	355.98	5.86	54	39.65	60	30.22	19

- 70ha of sites are at risk of flooding in the 1 in 100 year event (Flood Zone 3a+3b)
- Out of 60 sites in Flood Zone 3a on average 27% of each site is at flood risk
- 76ha of sites are at risk of flooding in the 1 in 1000 year event (Flood Zone 2+3a+3b)
- Out of 54 sites in Flood Zone 2 on average 10% of each site is at flood risk.

- 19 sites are situated in the Functional Floodplain and under PPS25 these will not be permitted. The total area of sites within Flood Zone 3b is 30.22ha and on average 35% of each site is within the Functional Floodplain.

It may be possible to redefine many of these site boundaries to make development acceptable.

Table 6-3: Summary of Potential Development Sites at Risk of Fluvial Flooding - Richmondshire DC

Development Sites	No. Sites	Total Area (ha)	Flood Zone 2		Flood Zone 3a		Flood Zone 3b	
			Area (ha)	No.	Area (ha)	No.	Area (ha)	No.
SHELAA[a]	103	423.84	1.45	9	15.29	13	0.05	1
Note a. Theses are potential development sites and subject to assessment.								

- 15.3ha of sites are at risk of flooding in the 1 in 100 year event (Flood Zone 3a+3b)
- Out of 13 sites in Flood Zone 3a on average 34% of each site is at flood risk
- 16.8ha of sites are at risk of flooding in the 1 in 1000 year event (Flood Zone 2+3a+3b)
- Out of 9 sites in Flood Zone 2 on average 2.8% of each site is at flood risk.
- 1 site is situated in the Functional Floodplain and under PPS25 will not be permitted. The total area of the site within Flood Zone 3b is only 0.05ha however.

It may be possible to redefine many of these site boundaries to make development acceptable.

6.2.2 Summary of sites at risk of surface water flooding

Table 6-4: Summary of Development Sites at Risk of Surface Water Flooding - Harrogate BC

Development Sites	No. Sites	Total Area (ha)	Vulnerability					
			Low		Intermediate		More	
			Area (ha)	No.	Area (ha)	No.	Area (ha)	No.
Allocations	435	1,363.23	96.58	273	57.35	157	25.79	55

The risk of surface water flooding to development site allocations in Harrogate Borough is potentially of a greater scale than fluvial flooding.

- 273 of the 435 designated sites are at some vulnerability to surface water flooding. This constitutes around 13% of the designated footprint of development.
- A total of 51 sites have a high vulnerability to surface water flooding that must be considered within the Sequential Test sieving process. If these sites go forward and are developed, a FRA must consider surface water mitigation techniques such as Sustainable Drainage Systems (SuDs) or a more open site layout.

Table 6-5: Summary of Development Sites at Risk of Surface Water Flooding - Craven DC

Development Sites	No. Sites	Total Area (ha)	Vulnerability					
			Low		Intermediate		More	
			Area (ha)	No.	Area (ha)	No.	Area (ha)	No.
SHELAA	183	355.98	27.01	151	40.25	111	29.82	52

The risk of surface water flooding to development site allocations in Craven District is potentially of a greater scale than fluvial flooding.

- 151 of the 183 designated sites are at some vulnerability to surface water flooding. This constitutes around 10% of the designated footprint of development.
- A total of 52 sites have a high vulnerability to surface water flooding that must be considered within the Sequential Test sieving process. If these sites go forward and are developed, a FRA must consider surface water mitigation techniques such as Sustainable Drainage Systems (SuDs) or a more open site layout.

Table 6-6: Summary of Proposed Development Sites at Risk of Surface Water Flooding - Richmondshire DC

Development Sites	No. Sites	Total Area (ha)	Vulnerability					
			Low		Intermediate		More	
			Area (ha)	No.	Area (ha)	No.	Area (ha)	No.
SHELAA[a]	103	423.84	58.01	58	29.30	35	10.08	16
Note a: Theses are potential development sites and subject to assessment.								

The risk of surface water flooding to development site allocations in Richmondhsire District is potentially of a greater scale than fluvial flooding.

- 58 of the 103 designated sites are at some vulnerability to surface water flooding. This constitutes around 19% of the designated footprint of development.
- A total of 16 sites have a high vulnerability to surface water flooding that must be considered within the Sequential Test sieving process. If these sites go forward and are developed, a FRA must consider surface water mitigation techniques such as Sustainable Drainage Systems (SuDs) or a more open site layout.

6.3 Introduction to Site Tables

The Sequential Test Spreadsheet provides detailed information about the proportion of each site in Flood Zones 1 , 2, 3a and 3b and at risk of water from surface water.

This has been combined with information from the SFRA maps and is presented in a set of site tables in the next three parts of this document:

- Section 7 - Harrogate Borough Council
- Section 8 - Craven District Council
- Section 9 - Richmondshire District Council

The sites are divided up by settlement. Each section has a table at the beginning which lists the complete set of site tables for each authority. The information in the tables does not provide a detailed flood risk assessment for a site as it is based on the existing strategic level data collected during the Level 1 SFRA. The tables should only be used in combination with the current SFRA maps and Environment Agency flood zone maps and help to identify issues which should be scoped site specific flood risk assessment.

Sites in Flood Zone 2 and 3 - These tables summarise sites which are partly or completely located in either Flood Zone 2 or 3 including:

- Summary of flood risk information - proportion of site in floodzones, scale of surface water risk, source of water course flooding and other sources of flooding where known.
- Recommendation for SFRA - This recommends whether the site should be allocated or avoided based on available flood risk information. This should be used in combination with the other site recommendations in the table which indicates where the site boundary should be adjusted to avoid flood risk areas, where site layout should be used to avoid risk and other site specific comments.
- Exception Test - this part of the table indentifies issues which are relevant for the Exception Test should development be proposed on the site and should be considered in a detailed FRA or a Level 2 SFRA.
- Site Recommendations - These should be used with the other information during the sequential testing process (e.g. to adjust site boundaries or layout to reduce flood risk) and to inform the Level 2 SFRA recommendations.

Sites with more than 90% in Flood Zone 1 are in separate tables for some communities. At these sites the area at risk of flooding is less than the open space criteria used by Richmondshire District Council (10% open space) and flood risk could be avoided by careful site layout with areas at risk of flooding left as open space. Where flood risk is on the edge of the site boundaries can be adjusted to exclude the areas at risk of flooding.

Sites in Flood Zone 1 - The sites which were found to be completely in Flood Zone 1 during this Level 1 SFRA assessment are listed in tables for each Local Authority.

7 Harrogate Borough Council Site Tables

7.1 Location of Tables - Harrogate Borough Council

These tables summarise information for potential development sites provided in Autumn 2009, the list of sites was updated in January 2010 to remove sites no longer under consideration and these sites are not listed in the detailed site tables.

7.2 Ripon Sites in Flood zones 2 and 3

RIPON	R32 Land at Bishopton 9.0 Ha	R2f Land at Littlethorpe Manor 11.5 Ha	R44 Ripon Fire Station, Stonebridgegate 0.2h	R1005 Land off North Road, Ripon 0.4H	R10 Land at Ripon Auction Mart, North Road 2.6 H	R1004 The Wolseley Centre, Harrison Way 1.0 H
Land Use	Housing	Housing	Housing	Housing	Housing	Housing
Area (Ha)	8.82	11.63	0.31	0.39	2.62	1.04
% of site in FZ1	41.95	34.74	28.68	9.13	0.00	0.00
% of site in FZ 2	57.99	15.37	71.32	90.87	100	99.98
% of site in FZ 3a	0.06	38.45	0.00	0.00	0.00	0.00
% of site in FZ 3b	0.00	11.44	0.00	0.00	0.00	0.02
% site at risk of flooding (in FZ 2 or 3)	58.05	65.26	71.32	90.87	100.00	100.00
Total % of site vulnerable to surface water flooding	>50%	10% to 50%	<10%	10% to 50%	10% to 50%	10% to 50%
Source of watercourse flooding	R Ure	R Ure	R Ure	R Ure	R Ure In 1947 flood outline	R Skell/ Ure On the edge of the 1947 flood outline
Other sources of flooding?	Surface Water	Canal	×	×	×	×
FZ 3 area requiring compensation flood storage - (Ha)	0.01	5.8	0.00	0.00	0.00	0.00

RIPON	R32 Land at Bishopton 9.0 Ha	R2f Land at Littlethorpe Manor 11.5 Ha	R44 Ripon Fire Station, Stonebridgegate 0.2h	R1005 Land off North Road, Ripon 0.4H	R10 Land at Ripon Auction Mart, North Road 2.6 H	R1004 The Wolseley Centre, Harrison Way 1.0 H
SEQUENTIAL TEST						
SFRA Recommendation (Allocate/avoid)	Avoid	Avoid	Avoid	Avoid	Avoid	Avoid
EXCEPTION TEST						
Defended	×	✓ Adjacent to flood warning area	part	×	✓	× Adjacent to flood warning area
Greenfield	✓	✓	×	infill	✓	×
Access during Flood Event	To N and E	To Littlethorpe Rd	To Stonebridge gate	To North Rd (SW)	×	×
Model available	✓	✓	✓	✓	✓	✓

RIPON	R32 Land at Bishopton 9.0 Ha	R2f Land at Littlethorpe Manor 11.5 Ha	R44 Ripon Fire Station, Stonebridgegate 0.2h	R1005 Land off North Road, Ripon 0.4H	R10 Land at Ripon Auction Mart, North Road 2.6 H	R1004 The Wolseley Centre, Harrison Way 1.0 H
Comment	• **Exception test required for housing development in FZ 3a (0.06% of site).** • Housing in FZ 2 (58%) does not need exception test. • Risk of surface water flooding. • Depth of Flooding < 0.5m	• **Exception test required for housing development in FZ 3a (43% of site).** • Housing in FZ 2 (11%) does not need exception test. • **11% of site in flood zone 3b** • Risk of surface water flooding.	• Housing in FZ 2 (79%) does not need exception test.	• Housing in FZ 2 (91%) does not need exception test. • Risk of surface water flooding.	• Housing in FZ 2 (100%) does not need exception test. • Risk of surface water flooding. • Access difficult during flood event. • Depth of Flooding up to1m in channel across middle of site.	• Housing in FZ 2 (99.9%) does not need exception test. • Risk of surface water flooding Access difficult during flood event.

RIPON	R32 Land at Bishopton 9.0 Ha	R2f Land at Littlethorpe Manor 11.5 Ha	R44 Ripon Fire Station, Stonebridgegate 0.2h	R1005 Land off North Road, Ripon 0.4H	R10 Land at Ripon Auction Mart, North Road 2.6 H	R1004 The Wolseley Centre, Harrison Way 1.0 H
SITE RECOMMENDATION						
Recommendation for Development	• Consider access to site during flood events at site design stage. • Site at risk of surface water flooding and this should be considered during site design. • Use site layout to avoid developing in FZ 2.	• Consider access to site during flood events at site design stage. • Site at risk of surface water flooding and this should be considered during site design. • Use site layout to avoid developing in FZ 3. • Do not develop in flood zone 3b • Investigate role of defences in managing risk at the site.	• Consider access to site during flood events at site design stage. • Use site layout to avoid developing in FZ 2. • Investigate role of defences in managing risk at the site.	• Consider access to site during flood events at site design stage. • Site at risk of surface water flooding and this should be considered during site design.	• Consider access to site during flood events at site design stage. • Site at risk of surface water flooding and this should be considered during site design. • Investigate role of defences in managing risk at the site.	• Consider access to site during flood events at site design stage. • Site at risk of surface water flooding and this should be considered during site design. • Do not develop in flood zone 3b

7.3 Ripon Sites Marginally in Flood zones 2 and 3

RIPON - marginal	R 2000 Ripon Police Station, Ripon	R17 Old Goods Yard, Hutton Bank, Ripon 1.4H
Land Use	Housing	Housing
Area (Ha)	0.62	1.40
% of site in FZ1	98.85	96.36
% of site in FZ 2	1.15	2.24
% of site in FZ 3a	0.00	1.40
% of site in FZ 3b	0.00	0.00
% site at risk of flooding (in FZ 2 or 3)	1.15	3.64
Total % of site vulnerable to surface water flooding	10% to 50%	<10%
Source of watercourse flooding	R Ure	R Ure
SEQUENTIAL TEST		
SFRA Recommendation (Allocate/avoid)	Allocate	Allocate
SITE RECOMMENDATION		
Recommendation for Development - update	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Consider access to site during flood events at site design stage. • Site may be at risk of surface water flooding and this should be considered during site design.	

7.4 Knaresborough Sites in Flood zones 2 and 3

KNARESBOROUGH	Land at Highfield Farm, Knaresborough (K2008)	K2b Manse Farm	K2a Manse Farm	K25 Land off Wetherby Road 0.6 ha	K2c Manse Farm	K19 Wetherby Road
Land Use	Housing	Mixed Use	Housing	Housing	Employment	Housing
Area (Ha)	6.20	41.44	1.41	0.61	1.87	0.85
% of site in FZ1	97.99	94.89	83.96	34.22	16.16	5.38
% of site in FZ 2	0.26	1.17	1.66	57.23	38.22	40.98
% of site in FZ 3a	1.74	3.93	14.39	7.26	27.99	26.75
% of site in FZ 3b	0.00	0.00	0.00	1.28	17.62	26.90
% site at risk of flooding (in FZ 2 or 3)	2.01	5.11	16.04	65.78	83.84	94.62
Total % of site vulnerable to surface water flooding	10% to 50%	10% to 50%	>50%	<10%	10% to 50%	>50%
Source of watercourse flooding	The Rampart	Frogmire Dyke	Frogmire Dyke	R. Nidd	R. Nidd + Frogmire Dyke	R. Nidd
Other sources of flooding?	×	×	Surface Water	×	×	Surface water
FZ 3 area requiring compensation flood storage - (Ha)	0.11	1.63	0.20	0.05	0.85	0.45
SEQUENTIAL TEST SFRA recommendation (Allocate/ avoid)						
	Allocate	Allocate	Allocate	Avoid	Avoid	Avoid
EXCEPTION TEST						
Defended	×	×	×	×	×	×
Greenfield	✓	✓	✓	undeveloped	✓	undeveloped

KNARESBOROUGH	Land at Highfield Farm, Knaresborough (K2008)	K2b Manse Farm	K2a Manse Farm	K25 Land off Wetherby Road 0.6 ha	K2c Manse Farm	K19 Wetherby Road
Access	A59 floods to E and W of site	A59 floods adjacent to site	Hay A Park Lane floods to west and joins A59 to S between two FZ 2 stretches.	Access to Grimbald Crag Way during 1 in 100 event	York Rd (A59) Floods to the west	Wetherby Rd floods adjacent to site
Model available	×	✓	✓	✓	✓	✓
Comment	• Site marginally at risk of flooding • **Exception Test required for housing in FZ 3a (2% of site)**	• Site marginally at risk of flooding **Exception Test required for housing in FZ 3a (4% of site)**	• **Exception Test required for housing in FZ 3a (14% of site)**	• More than 50% of the site is in FZ 2. • **Exception Test required for housing in FZ 3a (7% of site)**. • Depth of flooding >0.5m	• **18% in FZ 3b**. • Employment (less vulnerable) development in 3a and 2. 83%% of site in FZ 2 or 3.	• **Exception test required for housing development in FZ 3a** (27% of site). Housing in FZ 2 (41%) does not need exception test. • **More than 25% in FZ 3b.** • Access to site floods. • Risk of SW flooding. • Depth of Flooding > 0.5m
SITE RECOMMENDATION						

KNARESBOROUGH	Land at Highfield Farm, Knaresborough (K2008)	K2b Manse Farm	K2a Manse Farm	K25 Land off Wetherby Road 0.6 ha	K2c Manse Farm	K19 Wetherby Road
Recommendation for Development	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Consider access to site during flood events during site design stage as the A59 is at risk of flooding close to the site. • Use site layout to avoid developing in FZ 3.	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Consider access to site during flood events during site design stage as the A59 is at risk of flooding close to the site. • Use site layout to avoid developing in FZ 3.	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Consider access to site during flood events during site design stage as the A59 and Hay A Park Lane are at risk of flooding close to the site. • Site at risk of surface water flooding and this should be considered during site design. • Use site layout to avoid developing in FZ 3.	• Consider access to site during flood events at site design stage. • Use site layout to avoid developing in FZ 3. • Do not develop in flood zone 3b.	• Consider access to site during flood events at site design stage. • Use site layout to avoid developing in FZ 3. • Avoid develop-ment on candidate 3b floodplain. • Do not develop in flood zone 3b.	• Consider access to site during flood events at site design stage. • Site at risk of surface water flooding and this should be considered during site design. • Use site layout to avoid developing in FZ 3. • Do not develop in flood zone 3b

7.5 Harrogate Sites in Flood zones 2 and 3

HARROGATE	H8 Land to N of A59, Skipton Rd. 15.5Ha	H100 Land at Bilton 3.2H	Knox Hill Farm, Ripon Rd. (H15b)	H19 Nitter Hill, Penny Pot Lane 1.1Ha	H15 Knox Hill Farm, Ripon Rd. 23.8Ha	H29 Land at Kingsley Road 3.6Ha	Nitter Hill, Penny Pot Lane (H19a)	H22 Grange Farm, Skipton Road 7.3Ha
Land Use	Housing	Housing	Housing	Housing	Housing	Mixed Use	Housing	Housing
Area (Ha)	15.51	3.16	5.98	1.13	23.81	3.57	2.53	7.28
% of site in FZ1	99.41	98.74	98.47	97.75	90.08	88.91	66.17	52.21
% of site in FZ 2	0.02	0.44	0.00	0.01	0.12	0.00	0.10	3.93
% of site in FZ 3a	0.57	0.83	1.53	2.24	9.80	11.09	33.73	43.86
% of site in FZ 3b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
% site at risk of flooding (in FZ 2 or 3)	0.59	1.26	1.53	2.25	9.92	11.09	33.83	47.79
Total % of site vulnerable to surface water flooding	<10%	<10%	<10%	<10%	<10%	<10%	<10%	<10%
Source of watercourse flooding	Cow Dyke Beck	Oak Beck	Oak Beck	Oak Beck	Oak Beck	Star Beck	Oak Beck	Oak Beck + Cow Dyke Beck
Other sources of flooding?	Surface water	×	×	×	×	×	Surface Water	Surface Water
FZ 3 area requiring compensation flood storage - (Ha)	0.09	0.03	0.09	0.03	2.33	0.40	0.85	3.19

HARROGATE	H8 Land to N of A59, Skipton Rd. 15.5Ha	H100 Land at Bilton 3.2H	Knox Hill Farm, Ripon Rd. (H15b)	H19 Nitter Hill, Penny Pot Lane 1.1Ha	H15 Knox Hill Farm, Ripon Rd. 23.8Ha	H29 Land at Kingsley Road 3.6Ha	Nitter Hill, Penny Pot Lane (H19a)	H22 Grange Farm, Skipton Road 7.3Ha
		SEQUENTIAL TEST						
SFRA recommendation (Allocate/ avoid)		Allocate	Allocate	Allocate	Allocate	Allocate	Avoid	Avoid
		EXCEPTION TEST						
Defended	×	×	✓	✓	✓	×	×	✓
Greenfield	✓	×	✓	part	✓	✓	✓	✓
Access during Flood Event	Access to Skipton Rd	Access to Knox Lane	Access to Knox Lane and west of site	Access during flood	Access to Knox Lane and west of site	Access during flood	Access to Cornwall Rd Ave	No access from land north of Cow Dyke Beck to Skipton Rd
Model available	×	×	×	×	×	×	×	×

HARROGATE	H8 Land to N of A59, Skipton Rd. 15.5Ha	H100 Land at Bilton 3.2H	Knox Hill Farm, Ripon Rd. (H15b)	H19 Nitter Hill, Penny Pot Lane 1.1Ha	H15 Knox Hill Farm, Ripon Rd. 23.8Ha	H29 Land at Kingsley Road 3.6Ha	Nitter Hill, Penny Pot Lane (H19a)	H22 Grange Farm, Skipton Road 7.3Ha
Comment	• **Exception test required for housing developme nt in FZ 3a (<1% of site).** Housing in FZ 2 (<1%) does not need exception test. • Risk of SW flooding. Depth of Flooding < 0.5m	• **Exception test required for housing developm ent in FZ 3a (<1% of site).** Housing in FZ 2 (<1%) does not need exception test. • Depth of Flooding < 0.5m	• **Exception test required for housing developm ent in FZ 3a (<2%% of site).** • Depth of Flooding < 1m • Site includes some candidate 3b.	• **Exception test required for housing developm ent in FZ 3a (<3%% of site).** Housing in FZ 2 (<1%%) does not need exception test. • Depth of Flooding < 1m	• **Exception test required for housing developm ent in FZ 3a (9.8% of site).** Housing in FZ 2 (<1%) does not need exception test. • Depth of Flooding <1m	• **Exception test required for housing developm ent in FZ 3a (11% of site).**	• **Exception test required for housing developm ent in FZ 3a (34% of site).** Housing in FZ 2 (<1%) does not need exception test. • Risk of SW flooding. Depth of Flooding <1m	• **Exception test required for housing developm ent in FZ 3a (44% of site).** Housing in FZ 2 (4%) does not need exception test. • Risk of SW Flooding. • No access from area north of Cow Dyke Beck to Skipton Rd. flooding. • Depth of Flooding < 0.5m
		SITE RECOMMENDATION						

HARROGATE	H8 Land to N of A59, Skipton Rd. 15.5Ha	H100 Land at Bilton 3.2H	Knox Hill Farm, Ripon Rd. (H15b)	H19 Nitter Hill, Penny Pot Lane 1.1Ha	H15 Knox Hill Farm, Ripon Rd. 23.8Ha	H29 Land at Kingsley Road 3.6Ha	Nitter Hill, Penny Pot Lane (H19a)	H22 Grange Farm, Skipton Road 7.3Ha
Recommendation for Development	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Site at risk of surface water flooding and this should be considered during site design. • Use site layout to avoid developing in FZ 3. • Investigate role of defences in managing risk at the site.	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Use site layout to avoid developing in FZ 3.	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Use site layout to avoid developing in FZ 3. • Avoid develop-ment on candidate 3b floodplain. • Investigate role of defences in managing risk at the site.	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Use site layout to avoid developing in FZ 3. • Investigate role of defences in managing risk at the site.	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Use site layout to avoid developing in FZ 3. • Avoid develop-ment on candidate 3b floodplain. • Investigate role of defences in managing risk at the site.	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Use site layout to avoid developing in FZ 3. •	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Site at risk of surface water flooding - consider during site design. • Use site layout to avoid developing in FZ 3. • Avoid develop-ment on candidate 3b floodplain.	• No access to part of site north of Cow Dyke Beck. • Site at risk of surface water flooding and this should be considered during site design. • Use site layout to avoid developing in FZ 3. • Investigate role of defences in managing risk at the site.

7.6 Pateley Bridge Sites in Flood zones 2 and 3

PATELEY BRIDGE	P6 Coal yard, Greenwood Road 0.5 h	P2 Pateley Bridge Highways Depot 0.6 Ha
Land Use	Housing	Mixed Use
Area (Ha)	0.53	0.66
% of site in FZ1	24.77	94.61
% of site in FZ 2	7.04	4.46
% of site in FZ 3a	68.18	0.94
% of site in FZ 3b	0.00	0.00
% site at risk of flooding (in FZ 2 or 3)	75.22	0.94
Total % of site vulnerable to surface water flooding	>50%	>50%
Source of watercourse flooding	R Nidd	R Nidd
Other sources of flooding?	Surface Water	Surface water
FZ 3 area requiring compensation flood storage - (Ha)	0.36	0.01
SEQUENTIAL TEST		
SFRA recommendation (Allocate/ avoid)	Avoid	Avoid - unless safe site access can be arranged during flood event
EXCEPTION TEST		
Defended	✓	✓
Greenfield	×	×
Access during flood event	Access to Greenwood Rd	×
Model available	×	×

PATELEY BRIDGE	P6 Coal yard, Greenwood Road 0.5 h	P2 Pateley Bridge Highways Depot 0.6 Ha
Comment	• **Exception test required for housing development in FZ 3a (68% of site).** Housing in FZ 2 (7%) does not need exception test. • Risk of surface water Flooding.	• **Exception test required for housing development in FZ 3a (1% of site).** Housing in FZ 2 (4.5%) does not need exception test. • Risk of SW Flooding. • No access during flood event.
SITE RECOMMENDATION		
Recommendation for Development	• Consider access to site during flood events during site design stage. • Site at risk of surface water flooding and this should be considered during site design. • Role of flood defences in managing risk at this site should be investigated.	• Consider access to site during flood events during site design stage. Consult with emergency planners. • Site at risk of surface water flooding and this should be considered during site design. • Role of flood defences in managing risk at this site should be investigated, particularly their role in maintaining safe access to the site.

7.7 Boroughbridge Sites in Flood zones 2 and 3

BOROUGH-BRIDGE	B12 Farnell Technology Park	B18 Brickyard Rd, Borough Bridge	B2 Land South of Roecliffe Lane	B17 Bar Lane, Boroughbridge	B4 Three Arrows Field	B8 Land North of Milby Cut	B11(1) Riverside Sawmills	B11 Riverside Sawmills
Land Use	Mixed Use	Employment	Housing	Employment	Housing	Housing	Housing	Housing
Area (Ha)	6.02	11.21	3.84	1.71	5.39	5.54	3.93	2.68
% of site in FZ1	97.32	94.03	92.65	86.05	77.30	68.66	28.43	27.76
% of site in FZ 2	0.37	5.97	0.65	1.40	22.70	10.84	58.02	55.99
% of site in FZ 3a	2.30	0.00	6.70	12.55	0.00	20.50	13.55	16.25
% of site in FZ 3b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
% site at risk of flooding (in FZ 2 or 3)	2.68	5.97	7.35	13.95	22.70	31.34	71.57	72.24
Total % of site vulnerable to surface water flooding	<10%	10% to 50%	10% to 50%	10% to 50%	<10%	<10%	<10%	<10%
Source of watercourse flooding	R Tutt	R Ure	R Tutt	R Tutt	R Ure	R Ure / Milby Cut	R Ure	R Ure
Other sources of flooding?	×	×	×	×	×	×	×	×

BOROUGH-BRIDGE	B12 Farnell Technology Park	B18 Brickyard Rd, Borough Bridge	B2 Land South of Roecliffe Lane	B17 Bar Lane, Boroughbridge	B4 Three Arrows Field	B8 Land North of Milby Cut	B11(1) Riverside Sawmills	B11 Riverside Sawmills
FZ 3 area requiring compensation flood storage - (Ha)	0.14	0.00	0.26	0.21	0.00	1.13	0.53	0.44
SEQUENTIAL TEST								
SFRA recommendation (Allocate/ avoid)	Allocate	Allocate	Allocate	Allocate	Allocate	Avoid	Avoid	Avoid
EXCEPTION TEST								
Defended	×	✓	×	×	×	×	Part of site	Part of Site
Greenfield	×	✓	✓	✓	✓	×	×	×
Access during Flood Event	Access to east of site	No access to Brickyard Lane, alternative access to N required	Access to north of site	Access to north of site	Access to Roecliffe Lane	Access to West	Access to Valuation Lane	Access to Valuation Lane
Model available	×	×	×	×	×	×	×	×

BOROUGH-BRIDGE	B12 Farnell Technology Park	B18 Brickyard Rd, Borough Bridge	B2 Land South of Roecliffe Lane	B17 Bar Lane, Boroughbridge	B4 Three Arrows Field	B8 Land North of Milby Cut	B11(1) Riverside Sawmills	B11 Riverside Sawmills
Comment	• **Exception test required for housing develop-ment in FZ 3a (2.3% of site).** • Housing in FZ 2 (0.4%) does not need exception test. • Depth of Flooding <0.5m	• Access must avoid brickyard lane	• **Exception test required for housing develop-ment in FZ 3a (6.7% of site).** Housing in FZ 2 (0.7%) does not need exception test. • Depth of Flooding <0.5m	• 14% of site at risk of flooding in flood zone 2 or 3.	• Housing in FZ 2 (11%) does not need exception test.	• **Exception test required for housing develop-ment in FZ 3a (20% of site).** Housing in FZ 2 (11%) does not need exception test. • Depth of Flooding <1m	• **Exception test required for housing develop-ment in FZ 3a (14% of site).** Housing in FZ 2 (58%) does not need exception test. • Depth of Flooding <2m	• **Exception test required for housing develop-ment in FZ 3a (16% of site).** Housing in FZ 2 (56%) does not need exception test. • Depth of Flooding <2m
SITE RECOMMENDATION								

BOROUGH-BRIDGE	B12 Farnell Technology Park	B18 Brickyard Rd, Borough Bridge	B2 Land South of Roecliffe Lane	B17 Bar Lane, Boroughbridge	B4 Three Arrows Field	B8 Land North of Milby Cut	B11(1) Riverside Sawmills	B11 Riverside Sawmills
Recommend-ation for Development	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Consider access to site during flood events at site design stage. • Use site layout to avoid developing in FZ 3.	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Consider access to site at site design stage - Brickyard land is flooded. • Site at risk of surface water flooding - consider during site design. • Investigate role of defences in managing risk	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Site at risk of surface water flooding and this should be considered during site design. • Use site layout to avoid developing in FZ 3.	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Site at risk of surface water flooding and this should be considered during site design. • Use site layout to avoid developing in FZ 3.	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Use site layout to avoid develop-ing in FZ 3.	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Use site layout to avoid developing in FZ 3.	• Use site layout to avoid developing in FZ 3. • Investigate role of defences in managing risk at the site.	• Use site layout to avoid developing in FZ 3. • Investigate role of defences in managing risk at the site.

7.8 Masham Sites in Flood zones 2 and 3

MASHAM	M7 Jameson's Warehouse & Office, Leyburn Road 0.2h	M1002 Westholme Road, Masham 1.6H	M5 Fearby Road 0.9Ha	M6 Westholme Road 1.2H	M1 Auction Mart, Leyburn Road 1.0H
Land Use	Housing	Housing	Housing	Housing	Mixed Use
Area (Ha)	0.24	1.59	0.84	1.09	1.04
% of site in FZ1	93.94	64.03	0.74	0.00	0.00
% of site in FZ 2	6.06	32.13	84.06	63.90	7.95
% of site in FZ 3a	0.00	3.84	15.20	36.10	92.05
% of site in FZ 3b	0.00	0.00	0.00	0.00	0.00
% site at risk of flooding (in FZ 2 or 3)	6.06	35.97	99.26	100.00	100.00
Total % of site vulnerable to surface water flooding	10% to 50%	<10%	<10%	10% to 50%	10% to 50%
Source of watercourse flooding	Swinney Beck	Swinney Beck	Swinney Beck	Swinney Beck	Swinney Beck
Other sources of flooding?	Surface water	×	×	×	Surface Water
FZ 3 area requiring compensation flood storage - (Ha)	0.00	0.06	0.13	0.39	0.96
SEQUENTIAL TEST					
SFRA recommendation (Allocate/ avoid)	Allocate - subject to investigation of depth in 1 in 1000 event.	Avoid - access	Avoid	Avoid	Avoid
EXCEPTION TEST					

MASHAM	M7 Jameson's Warehouse & Office, Leyburn Road 0.2h	M1002 Westholme Road, Masham 1.6H	M5 Fearby Road 0.9Ha	M6 Westholme Road 1.2H	M1 Auction Mart, Leyburn Road 1.0H
Defended	Near to existing flood warning area, no defences	×	×	In existing flood warning area, no defences	In existing flood warning area, no defences
Greenfield	×	✓	✓	✓	×
Access during flood event	Access during 1 in 100 event, may be problems during a larger event.	No access to Westholme Rd and Foxholme Lane during a 1 in 100 flood event.	×	×	×
Model available	✓	✓	✓	✓	✓
Comment	• Housing in FZ 2 (6%) does not need exception test. • Risk of surface water flooding. • Access to site flooded in 1 in 100 event • Depth of Flooding < 0.5m	• **Exception test required for housing development in FZ 3a (3.8% of site).** Housing in FZ 2 (32%) does not need exception test. • Access problems to Westholme Rd and Foxholme Lane • Depth of Flooding < 0.5m	• **Exception test required for housing development in FZ 3a (15% of site).** Housing in FZ 2 (84%) does not need exception test. • Site is an island in a 1 in 100 - no access • Depth of Flooding mostly < 0.5m some area up 1m.	• **Exception test required for housing development in FZ 3a (36% of site).** Housing in FZ 2 (64%) does not need exception test. • No access in 1 in 100 event. • Depth of Flooding mostly < 0.5m some area up 1m.	• **Exception test required for housing development in FZ 3a (92% of site).** Housing in FZ 2 (8%) does not need exception test. • Risk of surface water flooding. • Access problems during flood event • Depth of Flooding < 0.5m
SITE RECOMMENDATION					

MASHAM	M7 Jameson's Warehouse & Office, Leyburn Road 0.2h	M1002 Westholme Road, Masham 1.6H	M5 Fearby Road 0.9Ha	M6 Westholme Road 1.2H	M1 Auction Mart, Leyburn Road 1.0H
Recommendation for Development	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Consider access to site during flood events at site design stage. In particular, investigate depth of flooding in 1 in 1000 event. • Site at risk of surface water flooding and this should be considered during site design.	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Consider access to site during flood events at site design stage. Foxholme Lane and Westholme Rd flood adjacent to the site. • Use site layout to avoid developing in FZ 3.	• Consider access to site during flood events at site design stage. • Use site layout to avoid developing in FZ 3.	• Consider access to site during flood events at site design stage. • Site at risk of surface water flooding and this should be considered during site design. • Use site layout to avoid developing in FZ 3.	• Consider access to site during flood events at site design stage. • Site at risk of surface water flooding and this should be considered during site design. • Use site layout to avoid developing in FZ 3.

7.9 Village Sites in Flood zones 2 and 3

HARROGATE BC - RURAL	RL45b Land at Dacre Banks 0.5H	RL1086a Land off Marston Road, Tockwith	RL1086 Land off Marston Road, Tockwith 6.4H	RL 1086b Land off Marston Road, Tockwith	RL93 Glasshouses Mill 1.1 H	RL1086a(1) Land off Marston Road, Tockwith
Land Use	Housing	Housing	Housing	Housing	Housing	Housing
Area (Ha)	0.51	3.07	6.42	3.30	1.09	0.34
% of site in FZ1	87.53	86.95	80.72	76.22	76.11	63.64
% of site in FZ 2	12.47	2.37	2.79	3.20	6.78	13.29
% of site in FZ 3a	0.00	10.68	16.49	20.58	17.11	23.07
% of site in FZ 3b	0.00	0.00	0.00	0.00	0.00	0.00
% site at risk of flooding (in FZ 2 or 3)	12.47	13.05	19.28	23.78	23.89	36.36
Total % of site vulnerable to surface water flooding	10% to 50%	10% to 50%	10% to 50%	>50%	10% to 50%	10% to 50%
Source of watercourse flooding	R. Nidd	Sike Beck	Sike Beck	Sike Beck	R. Nidd	Sike Beck
Other sources of flooding?	×	×	×	×	×	×
FZ 3 area requiring compensation flood storage - (Ha)	0.00	0.33	1.06	0.68	0.19	0.08
SEQUENTIAL TEST						

HARROGATE BC - RURAL	RL45b Land at Dacre Banks 0.5H	RL1086a Land off Marston Road, Tockwith	RL1086 Land off Marston Road, Tockwith 6.4H	RL 1086b Land off Marston Road, Tockwith	RL93 Glasshouses Mill 1.1 H	RL1086a(1) Land off Marston Road, Tockwith
SFRA Recommendation (Allocate/avoid)	Allocate	Allocate	Allocate	Allocate	Allocate	Avoid - this part of site 1086 contains a significant proportion of the flood risk
EXCEPTION TEST						
Defended	×	×	×	×	×	×
Greenfield	✓	✓	✓	✓	×	✓
Access during Flood Event	✓	To NE	To Kirk Lane and NE	To Kirk Lane	To North	To NE
Model available	×	×	×	×	×	×
Comment	• Housing in FZ 2 (12%) does not need exception test. • Risk of surface water flooding. • Depth of Flooding < 0.5m	• **Exception test required for housing development in FZ 3a (11% of site).** • Housing in FZ 2 (2%) does not need exception test. • Risk of surface water flooding. • Depth of Flooding < 0.5m	• **Exception test required for housing development in FZ 3a (16.5% of site).** • Housing in FZ 2 (3%) does not need exception test. • Risk of surface water flooding. • Depth of Flooding < 0.5m	• **Exception test required for housing development in FZ 3a (21% of site).** • Housing in FZ 2 (3%) does not need exception test. • Risk of surface water flooding. • Depth of Flooding < 0.5m	• **Exception test required for housing development in FZ 3a (17% of site).** • Housing in FZ 2 (7%) does not need exception test. • Risk of surface water flooding. • Depth of Flooding < 0.5m	• **Exception test required for housing development in FZ 3a (23% of site).** • Housing in FZ 2 (13%) does not need exception test. • Risk of surface water flooding. • Depth of Flooding < 0.5m
SITE RECOMMENDATION						

HARROGATE BC - RURAL	RL45b Land at Dacre Banks 0.5H	RL1086a Land off Marston Road, Tockwith	RL1086 Land off Marston Road, Tockwith 6.4H	RL 1086b Land off Marston Road, Tockwith	RL93 Glasshouses Mill 1.1 H	RL1086a(1) Land off Marston Road, Tockwith
Recommendation for Development	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Consider access to site during flood events at site design stage. • Site at risk of surface water flooding and this should be considered during site design.	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Consider access to site during flood events at site design stage. • Site at risk of surface water flooding and this should be considered during site design. • Use site layout to avoid developing in FZ 3.	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Consider access to site during flood events at site design stage. • Site at risk of surface water flooding and this should be considered during site design. • Use site layout to avoid developing in FZ 3.	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Consider access to site during flood events at site design stage. • Site at risk of surface water flooding and this should be considered during site design. • Use site layout to avoid developing in FZ 3.	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Consider access to site during flood events at site design stage. • Site at risk of surface water flooding and this should be considered during site design. • Use site layout to avoid developing in FZ 3.	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Consider access to site during flood events at site design stage. • Site at risk of surface water flooding and this should be considered during site design. • Use site layout to avoid developing in FZ 3.

7.10 Village Sites Marginally in Flood zones 2 and 3

HARROGATE BC - RURAL	RL1034 Crooked Lane, Kirk Hammerton 2.0Ha	RL37b Land at Hampsthwaite 3.1H	RL1141 Land at Hampsthwaite 2.54Ha	RL1141(1) Land at Hampsthwaite	RL 118b Kennel Hall Farm area 130 ha	RL45c Land at Dacre Banks	1152 Land to the North of Topcliffe Road, Dishforth	RL1089 Land to Rear of Crown Farm Dishforth	RL39 Land at Minskip 2.4h
Land Use	Housing	Housing	Housing	Housing	Housing	Housing	Housing	Housing	Employment
Area (Ha)	2.00	3.11	2.88	1.59	48.51	1.21	2.38	7.11	2.46
% of site in FZ1	99.62	99.35	98.28	96.89	94.97	94.69	92.08	98.20	91.66
% of site in FZ 2	0.32	0.00	0.10	0.18	0.94	5.31	0.21	0.28	0.90
% of site in FZ 3a	0.06	0.65	1.62	2.92	4.09	0.00	7.71	1.51	7.45
% of site in FZ 3b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
% site at risk of flooding (in FZ 2 or 3)	0.38	0.65	1.72	3.11	5.03	5.31	7.92	1.79	8.34
Total % of site vulnerable to surface water flooding	<10%	10% to 50%	<10%	10% to 50%	<10%	10% to 50%	10% to 50%	<10%	21.83
Source of watercourse flooding	Kirk Hammerton Beck	Cockhill Beck	Cockhill Beck	Cockhill Beck	R Nidd	R Nidd	Soppa Gutter	Soppa Gutter	R Tutt
SEQUENTIAL TEST									
SFRA Recommendation (Allocate/avoid)	Allocate	Allocate	Allocate	Allocate	Allocate	Allocate	Allocate	Allocate	Allocate
SITE RECOMMENDATION									

HARROGATE BC - RURAL	RL1034 Crooked Lane, Kirk Hammerton 2.0Ha	RL37b Land at Hampsthwaite 3.1H	RL1141 Land at Hampsthwaite 2.54Ha	RL1141(1) Land at Hampsthwaite	RL 118b Kennel Hall Farm area 130 ha	RL45c Land at Dacre Banks	1152 Land to the North of Topcliffe Road, Dishforth	RL1089 Land to Rear of Crown Farm Dishforth	RL39 Land at Minskip 2.4h
Recommendation for Development	•					• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Consider access to site during flood events at site design stage. • Site may be at risk of surface water flooding and this should be considered during site design.			

7.11 Sites in Flood Zone 1 - Boroughbridge, Harrogate, Knaresborough, Masham, Pateley Bridge and Ripon,

Settlement	Site ID	Name	Land Use	Area (Ha)	Area at Risk of Surface Water Flooding
Boroughbridge	B3	B3 Land at Aldborough Gate, Minskip	Employment	2.48	<10%
	B5	B5 Land N of Skelton Road	Housing	0.31	<10%
	B100	B100 Land at Aldborough Gate	Employment	0.86	<10%
	B1000	B1000 Land between Aldborough Gate & Minskip Road	Employment	1.86	<10%
	B2001	Poultry Houses, Leeming Lane, Langthorpe	Housing	1.04	<10%
	B2002	Old Hall Caravan Park, Langthorpe	Housing	2.89	<10%
	B2000	Bar House, Roecliffe Lane, Boroughbridge	Housing	1.48	<10%
	B6	B6 Aldborough Gate	Housing	6.96	20% to 50%
Harrogate	H3	H3 Land North of Penny Pot Lane 27.6Ha	Housing	27.53	<10%
	H4a	H4a Bilton Triangle, N of Granby Farm 4.3Ha	Housing	4.22	<10%
	H4b	H4b Bilton Triangle, N of Kingsley Farm 7.5 Ha	Housing	7.55	<10%
	H14	H14 Hornbeam Park 4.3Ha	Housing	4.26	<10%
	H18	H18 Land N of Eastville Cottage, Ripon Road 0.4Ha	Housing	0.42	<10%
	H21	H21 Fulwith Mill Lane 1.6Ha	Housing	1.61	<10%
	H28	H28 Land at Hill Top Lane, Lund House Green 0.9Ha	Housing	0.94	<10%
	H35	H35 Follifoot Road , Pannal 6.4Ha	Housing	6.41	<10%
	H43	H 43 Oak Beck Park off Skipton Road 0.9 Ha	Employment	0.91	<10%
	H49	H49 Pannal Grange, Pannal Green 0.4 Ha	Housing	0.46	<10%
	H77	H77 Land at Beckwith Head 2.1H	Housing	2.07	<10%
	H102	H102 Kingsley Farm, Bilton Triangle 7.8H	Housing	7.82	<10%
	H39	H39 B.T. Training Centre St. George's Walk 3.7h	Housing	3.42	<10%
	H108	H108 Rossett Manor, Leadhall Lane 0.6 h	Housing	0.62	<10%
	H109	H109 Prince of Wales Mansion, York Place 0.2 h	Housing	0.17	<10%
	H1000	H1000 Land at Kingsley Drive 7.9H	Housing	7.91	<10%
	H1002	H1002 Harrogate DRA Sports Club, Starbeck 0.9Ha	Housing	0.87	<10%
	H1012	H1012 Knapping Mount, Harrogate 0.98H	Housing	0.99	<10%
	H1017	H1017 Grove Park Centre 0.3H	Housing	0.31	<10%
	H1071	H1071 Land off Princess Royal Way and Spacey House	Housing	0.62	<10%

Settlement	Site ID	Name	Land Use	Area (Ha)	Area at Risk of Surface Water Flooding
	H1021	H1021 Harrogate & Meadowbank Centres, 'S' Beck 0.3H	Housing	0.31	<10%
	H1019	H1019 adjacent to Stonefall Waste site 0.6H	Employment	0.60	<10%
	H1020	H1020 Woodfield House & Woodleigh Family Centre, 0.	Housing	0.53	<10%
	H1022	H1022 Harrogate Racquets Club, Firs Rd 0.5ha	Housing	0.50	<10%
	H1023	Ref H1023 Spa Tennis Club, Kent Drive, Harrogate 0.	Housing	0.62	<10%
	H1014	H1014 Diamond Place garages, Starbeck 0.1H	Housing	0.08	<10%
	H110(1)	H110(1) White's Removals, Mornington Terrace	Housing	0.34	<10%
	H105(1)	H105(1) Harlow Hill Depot	Housing	1.54	<10%
	H1026	Nidd Vale Motors Site, Leeds Road	Mixed Use	0.74	<10%
	H27(1)	Land at Jackland House Farm	Employment	4.34	<10%
	H2003	Land at Harrogate Grammar School, Harrogate	Housing	1.21	<10%
	H1024	H1024 Dunlopillo extension 9H	Mixed Use	9.04	<10%
	H9(1)	Land to East of Otley Road, Killinghall	Mixed Use	1.92	<10%
	H105	H105 Harlow Hill Depot 1.1 Ha	Housing	1.12	<10%
	H106	H106 Claro Road 4.4 Ha	Housing	4.40	<10%
	H110	H110 White's Removals, Mornington Terrace 0.1h	Housing	0.12	<10%
	H1011	H1011 Park View Car Park, Harrogate 0.18	Housing	0.18	<10%
	H15a	Knox Hill Farm, Ripon Rd.	Housing	1.93	<10%
	H31	H31 Land SE of Showground 11.5Ha	Employment	11.46	<10%
	H17	H17 Land at Penny Pot Lane 10.3Ha	Housing	10.30	<10%
	H1004	Harrogate College, Hornbeam Park,	Employment	1.74	<10%
	H74(1)	Dunlopillo Site, Pannal	Employment	8.07	<10%
	H74	H74 Dunlopillo Site, Pannal 6.7H	Employment	6.64	<10%
	H37	H37 Land SW of Cornwall Road 13.3 Ha	Housing	13.29	<10%
	H25	H25 Land at Harlow Hill, E of Crag Lane 10.1Ha	Housing	9.80	<10%
	H400	H400 Land S of Bogs Lane 2.8H	Housing	2.83	<10%
	H32(1)	Land at Cardale Park West	Housing	35.08	<10%
	H1016	H1016 Bachelor Gardens 1.9H	Housing	1.93	<10%
	H27	H27 Land at Jackson House Farm 19.3Ha	Employment	19.16	<10%
	H2	H2 Land West of Oaker Bank 28.2Ha	Housing	28.08	<10%

Settlement	Site ID	Name	Land Use	Area (Ha)	Area at Risk of Surface Water Flooding
	H4c	H4c Bilton Triangle, W of Longlands Farm 24.7Ha	Housing	25.02	<10%
	H107	H107 Station Parade 0.8 h	Mixed Use	0.84	<10%
	H9	H9 Land to N of A59 & E of Otley Rd. 27.9Ha	Mixed Use	27.92	<10%
	H60	H60 Hornbeam Park, Harrogate 2.1h	Employment	2.07	<10%
	H104	H104 Irongate Bridge Water Works 3.9 Ha	Housing	3.85	<10%
	H107a	Station Parade & Copthall Bridge House, Harrogate	Mixed Use	1.57	<10%
	H40	H40 Convent of the Holy Child 2.5 Ha	Housing	2.48	<10%
	H2002	Harrogate Police Station, Harrogate	Housing	0.54	10% to 50%
	H1027	Claro Road Depot, Claro Road	Housing	1.53	10% to 50%
	H8(1)	Land North of Skipton Road, Harrogate	Mixed Use	16.36	10% to 50%
	H7	H7 Starbeck Highways Dept. 0.6Ha	Housing	0.62	10% to 50%
	H1013	H1013 Spa Lane, Harrogate 0.18H	Housing	0.18	>50%
	K18	K18 Former Timber Yard, Hambleton Road 0.3h	Housing	0.29	<10%
	K16	K16 Former Cattle Market, Stockwell Road 0.8h	Housing	0.79	<10%
	K30	K30 Land on Blind Lane 0.3 h	Housing	0.68	<10%
	K2001	Land to South of Market Flat Lane, Scriven	Housing	1.95	<10%
	K2005	Community Education Centre, Chain Lane, Knaresborou	Housing	0.55	<10%
	K2009	Highfield House, Knaresborough	Housing	0.58	<10%
	K4	K4 Land at Boroughbridge Road	Employment	2.87	<10%
	K9	K9 S of Bar Lane & N of Hazleheads Lane	Housing	5.74	<10%
	K1004	K1004 Land at Hall Farm 30.0H	Housing	30.31	10% to 50%
	K9(1)	K9(1) S of Bar Lane & N of Hazleheads Lane	Housing	0.72	10% to 50%
	K7	K7 Land W of A6055 N of Knaresborough	Housing	11.17	10% to 50%
	K1001	K1001 Thistle Hill Nurseries, Knaresborough 2.0H	Housing	1.98	10% to 50%
	K1003	K1003 Land at Halfpenny Lane, north 5.7H	Housing	5.65	>50%
	K10	K10 Off Chain Lane 0.6 h	Housing	0.58	>50%
Knaresborough	K2000	Orchard House, Hazelheads Lane, Knaresborough	Housing	1.49	>50%
	M3	M3 Thorpe Road 0.3 H	Housing	0.28	<10%
	M1001	M1001 Thorpe Road, Masham 0.4H	Housing	0.35	10% to 50%
Masham	M1004	M1004 Land east of Thorpe Road, Masham 3.6H	Housing	3.61	10% to 50%
Pateley Bridge	P3	P3 Land at Low Wath Road 0.4 Ha	Housing	0.42	<10%

Settlement	Site ID	Name	Land Use	Area (Ha)	Area at Risk of Surface Water Flooding
	P1005	Land at Southlands, Pateley Bridge	Housing	1.21	<10%
	P1001	P1001 Land at Low Wath Road Pateley Bridge 0.5 H	Housing	0.53	10% to 50%
	P5a	Land opposite Nidderdale High School	Housing	2.30	10% to 50%
	P5	P5 Land opposite Nidderdale High School 2.8 Ha	Housing	2.83	10% to 50%
	P1	P1 Land off Church Lane 1.1 Ha	Housing	1.15	10% to 50%
	R34	R34 Land at Quarry Moor, Ripon 0.5H	Housing	0.52	<10%
	R3	R3 Ripon Grammar School, land off Kirkby Rd 3.0 H	Housing	2.97	10% to 50%
	R1006	R1006 Land off Knaresborough Road, Ripon 0.6H	Housing	0.58	<10%
	R1008	Former Offices and Library, Waterskellgate, Ripon	Housing	0.08	<10%
	R1009	Black Swan Yard and Former Laundry, Westgate	Housing	0.29	<10%
	R2003	Land at Knaresborough Road, Ripon	Housing	0.95	<10%
	R1002	R1002 Between B6265 And Bishopton 0.9H	Housing	0.87	<10%
	R23	R23 Red House, Palace Road 1.6 Ha	Housing	1.67	<10%
	R7	R7 Springfield Close Farm 3.2 Ha	Housing	3.19	<10%
	R4b	R4b Land at Ripon By Pass South 2.4 Ha	Housing	17.14	<10%
	R36	R36 Land at Mallorie Park Drive, Ripon 1.0H	Housing	1.01	10% to 50%
	R400	R400 Land at Whitcliffe Lane, Ripon 45.5H	Housing	45.52	10% to 50%
	R2002	Land at Hutton Bank, Ripon	Housing	12.50	10% to 50%
	R42a	Land off Tower Road	Housing	1.12	10% to 50%
	R4c	R4 Land at Ripon By Pass South 7.3Ha	Housing	7.45	10% to 50%
	R42	R42 Land off Tower Road 1.3 h	Housing	1.29	10% to 50%
	R2b	R2b Land at Littlethorpe Manor 0.5 Ha	Housing	0.47	10% to 50%
	R2c	R2c Land at Littlethorpe Manor 10.4 Ha	Housing	10.52	10% to 50%
	R2a	R2a Land at Littlethorpe Manor 1.1 Ha	Housing	1.19	>50%
Ripon	R1007	Land at 95 Harrogate Road, Ripon	Housing	0.50	>50%

7.12 Sites in Floodzone 1 - Rural Sites

Site ID	Name	Land Use	Area (Ha)	Area at Risk of Surface Water Flooding
RL501	RL501 Land adjacent to Westfields, Glasshouses 0.18	Housing	0.18	<10%
RL129	RL 129 Land at Wilsill 1.5H	Housing	1.54	<10%
RL553	RL553 Land at Willow Garth, Skelton on Ure	Housing	0.19	<10%
RL556	RL556 Land at S end of Skelton on Ure	Housing	0.13	<10%
RL135	RL135 Land at Boroughbridge Road, B Monkton 0.3H	Housing	0.33	<10%
RL134	RL134 Land at Lawnfield Drive, Bishop Monkton 0.2H	Housing	0.15	<10%
RL4	RL4 Land adjoining dev limit of Darley 0.2 Ha	Housing	0.22	<10%
RL6a	RL6a Land at grid ref 438100 472901, Dishforth 0.1	Housing	0.13	<10%
RL12	RL12 Land at Bernard Lane 0.9 Ha	Housing	0.87	<10%
RL13	RL13 Site adjacent to 4, Vic. Terr., Bishop Monkto	Housing	0.23	<10%
RL15	RL15 Ebor View, Green Hammerton 0.4 Ha	Housing	0.36	<10%
RL20	RL20 Haggs Farm Business Park, Follifoot 1.0H	Employment	1.04	<10%
RL43	RL43 Manor Fold Farm, Melmerby 1.1H	Housing	1.14	<10%
RL68	RL68 Massey Garth, Spofforth 0.7H	Housing	0.67	<10%
RL71	RL71 Land at Burton Leonard 0.5H	Housing	0.53	<10%
RL80	RL80 Melmerby Hall, Melmerby 0.3H	Housing	0.29	<10%
RL90	RL90 Land to rear of Oakley House, B Leonard 0.2H	Housing	0.21	<10%
RL99	RL99 Stump Lane, Darley 0.3H	Housing	0.32	<10%
RL115	RL115 Station Lane, Burton Leonard 7.9 H	Housing	7.89	<10%
RL1010	RL1010 Land off Wobeck Lane, Melmerby 0.8H	Housing	0.80	<10%
RL1008	RL1008 Land opposite Harewell Close, Glasshouses 0	Housing	0.90	<10%
RL1006	RL1006 Land at Grewelthorpe 0.8H	Housing	0.83	<10%
RL1017	RL1017 Adjacent to Glenshee, Spofforth Lane, Fol	Housing	0.33	<10%
RL1107	RL1107 Land south of Whinfields, Summerbridge 1.0	Housing	1.01	<10%
RL1108	RL1108 Land east of Main Street, Scotton 0.20Ha	Housing	0.21	<10%
RL1111	RL1111 Land at Stockfield Lane, Marton cum Grafton	Housing	1.93	<10%
RL1074	RL1074 East of the chalet, Markington 0.15Ha	Housing	0.15	<10%
RL1049	RL1049 Land adjacent to Meadow Court/Thorn Bank, B	Housing	0.16	<10%
RL1056	RL1056 Land north of Esk Gardens, Kirk Deighton 0.	Housing	0.14	<10%
RL1050	RL1050 Back Lane (Option 3), Great Ouseburn 0.84Ha	Housing	0.85	<10%
RL1048	RL1048 Midgeley Lane, Goldsborough 0.1Ha	Housing	0.13	<10%
RL1039	RL1039 Land south of Moor Lane, Dishforth 1.77Ha	Housing	1.76	<10%

Site ID	Name	Land Use	Area (Ha)	Area at Risk of Surface Water Flooding
RL1033	RL1033 Riversmead, Birstwith 0.19Ha	Housing	0.19	<10%
RL1038	RL1038 East of Grange Terrace, Melmersby 0.2Ha	Housing	0.22	<10%
RL1035	RL1035 Galphay Road, Kirkby Malzeard 0.95Ha	Housing	0.95	<10%
RL1057	RL1057 Mire Syke Lane, Scotton 0.56Ha	Housing	0.55	<10%
RL1021	RL1021 Adjacent to water works, Station Lane, Bur	Housing	0.17	<10%
RL1063	RL1063 Adjacent Richmond Garth, Kirkby Malzeard	Housing	0.43	<10%
RL1066	RL1066 Land parcel OS7862, Darley Road, Birstwith	Housing	0.49	<10%
RL1069	RL1069 Lupton Bank, Glasshouses 3.03Ha	Housing	3.02	<10%
RL1124	RL1124 Land south of The Grange, Dacre Banks 0.94	Housing	0.94	<10%
RL1079	RL1079 Boroughbridge Road, Green Hammerton 0.3 H	Housing	0.32	<10%
RL1091	RL1091 Land adjacent Lynngarth, Kirkby Malzeard 0.	Housing	0.18	<10%
RL1060	RL1060 Land east of Old Vicarage 0.5H	Housing	0.49	<10%
RL1094	RL1094 Land west of Oak Cottage, Follifoot 0.3H	Housing	0.25	<10%
RL1095	RL1095 Land east of Woodside, Follifoot 0.3H	Housing	0.35	<10%
RL1096	RL1096 Land east of Woodside, Follifoot 0.3H	Housing	0.32	<10%
RL1097	RL1097 Land east of the Church, Follifoot 0.3H	Housing	0.32	<10%
RL1098	RL1098 Landwest of the Radcliffe Arms, Follifoot 0.	Housing	0.43	<10%
RL1099	RL1099 Land north of the Radcliffe Arms, Follifoot	Housing	0.57	<10%
RL1100	RL1100 Land rear of Park House, Follifoot 0.4H	Housing	0.43	<10%
RL1101	RL1101 Land east of Manor Fold, Follifoot 0.6H	Housing	0.60	<10%
RL45a	RL45a Land at Dacre Banks 0.2H	Housing	0.19	<10%
RL1129	RL1129 Land to the west of High St, Whixley 1.8H	Housing	1.85	<10%
RL1130	RL1130 Land east of Station Rd, Whixley 0.2H	Housing	0.25	<10%
RL1131	RL1131 Land west of Station Rd, Whixley 0.7H	Housing	0.72	<10%
RL1126	RL1126 Yew Tree Farm, Marton 3.5H	Housing	3.46	<10%
RL1132	RL1132 Former Killinghall Garage 0.3H	Housing	0.14	<10%
RL1133	RL1133 Cabin Lane, Dacre Banks 1.1H	Housing	1.12	<10%
RL1134	RL1134 Builders Yard, Kirby Hill 1.2H	Housing	1.15	<10%
RL1135	RL1135 Barker's Farm Fold Yard, Lingham Lane 0.2H	Housing	0.15	<10%
RL1015	RL 1015 Land at Manor Dairy Farm, Killinghall 6.6H	Housing	6.65	<10%
RL3(1)	RL3(1) West House Farm	Housing	0.28	<10%
RL1133(1)	RL1133(1) Cabin Lane, Dacre Banks	Housing	0.32	<10%
RL1063(1)	RL1063(1) Adjacent Richmond Garth, Kirkby Malzeard	Housing	0.26	<10%

Site ID	Name	Land Use	Area (Ha)	Area at Risk of Surface Water Flooding
RL1142	Land at Lodge Farm Cottage, Kirk Hammerton	Housing	0.21	<10%
RL1126(1)	RL1126(1) Yew Tree Farm, Marton	Housing	0.26	<10%
RL1146	Land at Scriftain Lane, Kirk Deighton	Housing	0.36	<10%
RL1147	Land at West End Farm	Housing	0.18	<10%
RL117	Land at Knaresborough Road	Housing	0.80	<10%
RL1153	Land to the South of Topcliffe Road, Dishforth	Housing	0.30	<10%
RL2002	Land at White House, Darley	Housing	0.61	<10%
RL2005	Land South of Sheepcote Lane, Darley	Housing	0.94	<10%
RL2022	Land off Galphay Road, Kirkby Malzeard	Housing	2.26	<10%
RL2023	Land adjacent to Low Garth, Daw Cross	Housing	0.66	<10%
RL2024	Land Hillfoot Lane, Daw Cross	Housing	0.57	<10%
RL2025	Land adjacent to Addison Villas, Killinghall	Housing	4.29	<10%
RL2044	Land at Hall Cottages, Spofforth	Housing	0.63	<10%
RL2049	Land to the rear of Rivendell Cottage, Tockwith	Housing	0.39	<10%
RL2050a	Land North of Schoolhouse Terrace, Kirk Deighton	Housing	0.45	<10%
RL2057	Land to the rear of Angram Road, Long Marston	Housing	0.46	<10%
RL2071	Land at Haggs Bridge, Spofforth	Employment	0.32	<10%
RL1014	RL1014 Land south of Westfield Road 0.4H	Housing	0.40	<10%
RL103a	RL103a	Housing	0.17	<10%
RL1010a	Land the South of Wobeck Rise, Melmerby	Housing	0.45	<10%
RL2006	Land at West Grove, Bishop Thornton	Housing	0.25	<10%
RL118b(1)	Kennel Hall Farm, Killinghall	Housing	2.48	<10%
RL2022a	Land East of The Grange, Kirkby Malzeard	Housing	1.43	<10%
RL2022b	Land West of The Grange, Kirkby Malzeard	Housing	0.39	<10%
RL1034a	Land fronting Crooked Lane, Kirk Hammerton	Housing	0.37	<10%
RL1050a	Land East Back Lane, Great Ouseburn	Housing	0.65	<10%
RL2063	Land to theNorth of Old Lane, Long Marston	Housing	0.17	<10%
RL560	RL560 Sandy Lane, Glasshouses 0.5h	Housing	0.48	<10%
RL1073	RL1073 High Street/Thwaites Lane, Markington 0.25H	Housing	0.25	<10%
RL114	RL114 Apron Lane, Burton Leonard 4.0 H	Housing	4.03	<10%
RL1109	RL1109 Hawbers Farm, Burton Leonard 2.23Ha	Housing	2.22	<10%
RL87	RL87 Land at Grafton 0.5 H	Housing	0.48	<10%
RL1113a	Land between Minskip Road and Low Field Lane	Housing	6.31	<10%

Site ID	Name	Land Use	Area (Ha)	Area at Risk of Surface Water Flooding
RL1113	RL1113 Land between Minskip Road and Low Field Lane	Housing	3.29	<10%
RL1015(1)	RL 1015(1) Land at Manor Dairy Farm, Killinghall	Housing	2.20	<10%
RL2068	Land at Farnley Grange, Markington	Housing	0.91	<10%
RL121	RL121 Land N of St. John's Church, Sharow 1.2 h	Housing	1.15	<10%
RL1104	RL1104 Land west of B6164, Kirk Deighton 0.6H	Housing	0.62	<10%
RL118a(2)	Kennel Hall Farm (South East)	Housing	1.48	<10%
RL125	RL125 Land off Main Street, Scotton 1.4H	Housing	1.36	<10%
RL1116	RL1116 The Holt, Sharow 0.9H	Housing	0.89	<10%
RL70	RL70 West of All Saints Church, Staveley 1.1H	Housing	1.08	<10%
RL2061	Land at Brookfield Garth, Hampsthwaite	Housing	0.55	<10%
RL103b	RL103b Land at Tockwith 0.5H	Housing	0.50	<10%
RL102	RL102 Land at Goldsborough 1.5H	Housing	1.63	<10%
RL1149	Land to the West of The Paddocks, Staveley	Housing	2.01	<10%
RL2014	Land adjacent to Riggs Spring, Summerbridge	Housing	0.28	<10%
RL1093	RL1093 Land between Park Side and Oak Cottage	Housing	1.04	<10%
RL14	RL14 Land at Tockwith	Housing	4.49	<10%
RL73	RL73 Land at Burton Leonard 0.3H	Housing	0.29	<10%
RL1113(1)	RL1113(1) Land between Minskip Rd and Low Field Ln	Housing	0.44	<10%
RL1009	RL1009 Land north of Grainbeck Manor, Killinghall	Housing	1.48	<10%
RL42(1)	RL42(1) Land at Dishforth	Housing	0.39	<10%
RL38a	Land at Southfield Lane, Tockwith	Employment	8.03	<10%
RL27	RL27 Allotments off Knbro Rd, Bishop Monkton 1.8H	Housing	1.81	<10%
RL48	RL48 Land off Back Lane, Dishforth 0.4H	Housing	0.37	<10%
RL102a	Land at Cockstone Farm, Goldsborough	Housing	3.61	<10%
RL42	RL42 Land at Dishforth 2.0H	Housing	1.98	<10%
RL14(1)	RL14(1) Land at Tockwith	Housing	6.81	<10%
RL1145	Land adjacent to Sicklinghall Primary School	Housing	0.41	<10%
RL551	RL551 Land at Nidd House Farm Ha	Housing	10.25	<10%
RL55	RL55 Land at Kirby Hill 9.4 H	Housing	9.49	<10%
RL1013	RL1013 Land north of Hungate, Bishop Monkton	Housing	0.38	<10%
RL32	RL32 Land at Scotton 0.4H	Housing	0.37	<10%
RL1078	RL1078 Grange Farm, Melmerby 1.13Ha	Housing	1.13	<10%
RL1058	RL1058 Land south of Beckside House 0.8H	Housing	0.79	<10%

Site ID	Name	Land Use	Area (Ha)	Area at Risk of Surface Water Flooding
RL1059	RL1059 Land at Hill Top Farm 1.2H	Housing	1.16	<10%
RL1047	RL1047	Housing	0.16	<10%
RL500	RL500 Land at Daw Cross 44.0H	Housing	43.99	<10%
RL118a	RL 118a Kennel Hall Farm area 6.9ha	Housing	6.99	<10%
RL1102	RL1102 Land between Benard Lane and Harrogate Road	Housing	3.56	<10%
RL1093(1)	RL1093(1) Land between Park Side and Oak Cottage	Housing	0.43	<10%
RL131	RL131 Land adjacent to Summerbridge Methodist Ch.	Housing	0.56	<10%
RL81	RL81 The Croft, Kirk Deighton 1.1H	Housing	1.14	<10%
RL2036a	Land West of Parker Lane, Kirk Hammerton	Housing	0.89	<10%
RL1001	RL1001 Land off New Road, Scotton 0.3Ha	Housing	0.31	<10%
RL554	RL554 Land opposite Manor Farm, Skelton on Ure	Housing	0.89	<10%
RL1064b	Land South of Branton Lane, Great Ouseburn	Housing	4.95	<10%
RL79	RL79 Little Chef, A1 southbound, Rainton 1.6H	Employment	1.60	<10%
RL1011(1)	Agricon Premises, Station Road, Kirk Hammerton	Mixed Use	0.37	<10%
RL1034(1)	RL1034(1) Crooked Lane, Kirk Hammerton	Housing	0.52	<10%
RL98a	Sheepcote Lane, Darley	Housing	0.79	<10%
RL2021	Land to rear of East Park Road, Spofforth	Housing	0.57	<10%
RL2001	Wensleydale Creamery, Kirkby Malzeard	Housing	0.92	<10%
RL130	RL130 Bell Close Farm, Minskip	Housing	0.36	<10%
RL1115	RL1115 Land south of Carr Side Road, Great Ouseburn	Housing	0.67	<10%
RL1136	RL1136 Land at north end of Grewelthorpe 2.6H	Housing	2.56	<10%
RL72	RL72 Land at Burton Leonard 1.1H	Housing	1.09	<10%
RL1022	RL1022 Kendall Lane, Tockwith 0.9H	Housing	0.94	<10%
RL1019	RL1019 Land at junction of New Road and Back Lane,	Housing	2.82	<10%
RL1037	RL1037 Cricket Ground east of Ripon Rd, 1.7H	Housing	1.75	<10%
RL38	RL38 Land at Southfield Lane, Tockwith 1.2H	Employment	1.15	<10%
RL118a(3)	Kennel Hall Farm (Ripon Road Frontage)	Housing	3.59	<10%
RL1084	RL1084 Show Field, Birstwith 1.5H	Housing	1.55	<10%
RL2036	Land West of Parker Lane, Kirk Hammerton	Housing	0.51	<10%
RL3	RL3 West House Farm, Birstwith 3.0Ha	Housing	3.22	<10%
RL1127	RL1127 Peach Tree Farm, Minskip 1.4H	Housing	1.43	<10%
RL1151	Land to the rear of Village Hall, Lofthouse	Housing	0.16	<10%
RL2069	Land at Low Moor Lane, Lingerfield	Employment	1.13	<10%

Site ID	Name	Land Use	Area (Ha)	Area at Risk of Surface Water Flooding
RL76	RL76 Land at Burton Leonard 1.3H	Housing	1.28	<10%
RL110	RL110 Copgrove Road, Burton Leonard 1.7H	Housing	1.67	<10%
RL1128(1)	RL1128(1) Grange Farm, Minskip	Housing	0.25	<10%
RL1128	RL1128 Grange Farm, Minskip 2.5Ha	Housing	2.54	<10%
RL3c	West House Farm, Birstwith	Housing	1.79	<10%
RL1068	RL1068 West Farm, Whixley 0.72Ha	Housing	0.72	<10%
RL1088	RL1088 Land to the north of Dishforth 1.4H	Housing	1.34	<10%
RL2050b	Land South of Schoolhouse Terrace, Kirk Deighton	Housing	1.02	<10%
RL1087	RL1087 Land adjacent Grangefields, Dishforth 3.5H	Housing	3.53	<10%
RL1148(1)	Staveley Mill Farm, Staveley	Housing	3.66	10% to 50%
RL1144	Land at Angram Road, Long Marston	Housing	0.28	10% to 50%
RL11	RL11 Riffa Business Park 1.4 Ha	Employment	1.44	10% to 50%
RL1075	RL1075 High Mill Farm, Markington 0.36Ha	Housing	0.36	10% to 50%
RL37a	RL37a Land at Hampsthwaite 4.8H	Housing	4.81	10% to 50%
RL8	RL8 Land west of Barker Business Park, Melmerby	Employment	14.71	10% to 50%
RL2018	Land North of Barker Business Park, Melmerby	Employment	5.50	10% to 50%
RL8(1)	Land West of Barker Business Park, Melmerby	Employment	6.31	10% to 50%
RL1011	RL1011 Land at Station Road, Kirk Hammerton 0.6H	Housing	0.58	10% to 50%
RL118a(1)	Kennel Hall Farm (North East)	Housing	1.62	10% to 50%
RL2027	Land at Killinghall Quarry, Killinghall	Employment	0.70	10% to 50%
RL101	RL101 Land at Kirk Hammerton 11.5H	Housing	11.55	10% to 50%
RL2019	Land South of Barker Business Park, Melmerby	Employment	4.09	10% to 50%
RL1092	RL1092 Land at Brakehill Farm, Rainton 2.8H	Housing	2.73	10% to 50%
RL61	RL61 Middle Row, Marton 2.6 Ha	Housing	2.63	10% to 50%
RL1054	RL1054 Land west of Wetherby Road, Kirk Deighton	Housing	1.37	10% to 50%
RL131(1)	Land adjacent to Summerbridge Methodist Church	Housing	0.12	10% to 50%
RL10	RL10 Jackson's Haulage Depot, Kirk Hammerton	Housing	1.08	10% to 50%
RL124	RL124 Land at Mire Syke Lane, Scotton 2.2H	Housing	2.17	10% to 50%
RL1140	RL1140 Bellwood House, Minskip Road 1.4Ha	Housing	1.40	10% to 50%
RL98	RL98 Sheepcote Lane, Darley 1.5H	Housing	1.51	10% to 50%
RL1064a	Land South of Branton Lane, Great Ouseburn	Housing	0.62	10% to 50%
RL1043	RL1043 Land at Grainbeck Manor, Killinghall 1.82Ha	Housing	1.82	10% to 50%
RL95	RL95 Land at Marston Business Park 6.4H	Employment	6.47	10% to 50%

Site ID	Name	Land Use	Area (Ha)	Area at Risk of Surface Water Flooding
RL1122	RL1122 Rear of Crown Hotel, Lofthouse 1.35Ha	Housing	1.35	10% to 50%
RL1085(1)	RL1085(1) Land adj Birkhills, Burton Leonard	Housing	0.36	10% to 50%
RL2033	Land South of Straight Lane, Burton Leonard	Housing	1.11	10% to 50%
RL1000	RL1000 Land south of Crooked Lane, Kirk Hammerton	Housing	3.63	10% to 50%
RL37c	RL37c Land adjacent to Hollins Lane 3.0 h	Housing	3.05	10% to 50%
RL100	RL100 Branton Lane, Great Ouseburn 1.7H	Housing	1.71	10% to 50%
RL1085	RL1085 Land south of Straight Lane, Burton Leonard	Housing	1.15	10% to 50%
RL2016	Land adjacent Crowgarth, Skelton on Ure	Housing	0.36	10% to 50%
RL25a	RL25a Land at Follifoot 0.8H	Housing	0.77	10% to 50%
RL1046	RL1046	Housing	0.50	10% to 50%
RL555	RL555 Land at Manor Farm, Skelton on Ure	Housing	0.38	10% to 50%
RL1114	RL1114 Land adjoining Juibilee Mill, Copgrove 1.1	Employment	1.05	10% to 50%
RL555(1)	RL555(1) Land at Manor Farm, Skelton on Ure	Housing	0.25	10% to 50%
RL1007	RL1007 Land adjacent to the pond, Grewelthorpe 0.3	Housing	0.30	10% to 50%
RL39a	RL39a Land at Minskip 3.7H	Housing	3.68	10% to 50%
RL570	RL570 Land at Killinghall 3.0 Ha	Housing	2.97	10% to 50%
RL29a	RL29a Land at Long Marston 0.4H	Housing	0.39	10% to 50%
RL1112	RL1112 Land off Hollins Lane, Hampsthwaite 1.75Ha	Housing	1.75	10% to 50%
RL98(1)	RL98(1) Sheepcote Lane, Darley	Housing	0.69	10% to 50%
RL1055	RL1055 Southfield Lane, Tockwith 5.74Ha	Housing	5.71	10% to 50%
RL2054	Land at the airfield, Tockwith	Housing	8.45	10% to 50%
RL2035a	Land adjacent to Kirk Hammerton Primary School	Housing	1.37	10% to 50%
RL2043	Land at Castle Farm, Spofforth	Housing	0.97	10% to 50%
RL2011a	Land at the Bungalow, Rudgate Lane, Tockwith	Employment	1.63	10% to 50%
RL1064	RL1064 Land south of Branton Lane, Great Ouseburn	Housing	0.23	10% to 50%
RL2035	Land adjacent to Kirk Hammerton Primary School	Housing	0.74	10% to 50%
RL29c	Land at York Road, Long Marston	Housing	0.83	10% to 50%
RL2	RL2 Land at Arkendale Road, Staveley 0.5 Ha	Housing	0.53	10% to 50%
RL2011	Former Mushroom Farm, Rudgate Lane, Tockwith	Employment	0.37	10% to 50%
RL120	RL 120 Land at Station Road, Kirk Hammerton 1.1Ha	Housing	1.14	10% to 50%
RL1040	RL1040 Land off Back Lane, Dishforth 0.27Ha	Housing	0.27	10% to 50%
RL29b	RL29b Land at Long Marston 0.5H	Housing	0.51	10% to 50%
RL1110	RL1110 Park House, Lofthouse 1.1Ha	Housing	1.08	10% to 50%

Site ID	Name	Land Use	Area (Ha)	Area at Risk of Surface Water Flooding
RL60	RL60 South of Wetherby Road, Long Marston 0.8H	Housing	0.83	>50%
RL16	RL16 Land S of Maythorpe, Sharow 0.3Ha	Housing	0.33	>50%
RL133	RL133 Land at Burton Leonard 0.9H	Housing	0.95	>50%
RL2034	Land East of Parker Lane, Kirk Hammerton	Housing	1.70	>50%
RL113	RL113 Land at Darley 0.4H	Housing	0.41	>50%
RL1125	RL1125 The Grange, Dacre Banks 0.38Ha	Housing	0.37	>50%
RL1029	RL1029 Former Council yard, Green Hammerton 0.37Ha	Housing	0.37	>50%
RL2038	Land to West of Hammerton Close, Kirk Hammerton	Housing	0.55	>50%

8 Craven District Council Site Tables

8.1 Location of Tables - Craven District Council

8.2 Skipton Sites in Flood zones 2 and 3

Skipton - Flood zone 2 and 3	120 - West of the junction of Carleton New Road and Carleton Road	115 - Former Burnside Allotments, east of Carleton Road, west of Burnside Crescent	114 - Land bounded by Carleton Road, railway line, and A629 Skipton Bypass	116 - East of Skipton Bypass, south of Sandylands Playing Fields, and west of Carleton Road (Skipton South Site)	119 - West of Carleton Road, bounded by Eller Beck to west	102 - Land at Skibenden Beck, Otley Road	144 - West of Ings Lane	113 - South of sewage works, within Snaygill Industrial Estate
Land Use	Housing	Housing	Housing	Employment	Housing	Housing	Employment	Employment
Area (Ha)	0.81	1.83	11.29	26.10	0.65	0.24	2.15	0.97
% of site in FZ1	66.66	62.57	40.79	29.75	20.51	10.94	0.14	0.10
% of site in FZ 2	3.68	2.33	0.58	0.01	0.00	9.11	0.00	0.60
% of site in FZ 3a	10.37	9.48	56.08	31.58	0.29	79.95	2.60	2.96
% of site in FZ 3b	19.30	25.62	2.55	38.65	79.20	0.00	97.26	96.35
% site at risk of flooding (in FZ 2 or 3)	33.34	37.43	59.21	70.25	79.49	89.06	99.86	99.90
Total % of site vulnerable to surface water flooding	<10%	10% to 50%	10% to 50%	10% to 50%	10% to 50%	10% to 50%	>50%	>50%
Source of watercourse flooding	Eller/ Embsay Beck CDC Flood hotspot	Eller/ Embsay Beck CDC Flood Hotspot	Aire / Eller - Embsay Beck CDC Flood Hotspot	Aire / Eller - Embsay Beck	Aire / Eller - Embsay Beck	Waller Hill Beck CDC Flood Hotspot	Aire/ Ings Beck CDC Flood Hotspot	Aire

Skipton - Flood zone 2 and 3	120 - West of the junction of Carleton New Road and Carleton Road	115 - Former Burnside Allotments, east of Carleton Road, west of Burnside Crescent	114 - Land bounded by Carleton Road, railway line, and A629 Skipton Bypass	116 - East of Skipton Bypass, south of Sandylands Playing Fields, and west of Carleton Road (Skipton South Site)	119 - West of Carleton Road, bounded by Eller Beck to west	102 - Land at Skibenden Beck, Otley Road	144 - West of Ings Lane	113 - South of sewage works, within Snaygill Industrial Estate
Other sources of flooding?	×	×	Surface Water	Surface Water	×	culvert	culvert	×
FZ 3 area requiring compensation flood storage - (Ha)	0.24	0.64	6.62	18.33	0.52	0.19	2.15	0.97
SEQUENTIAL TEST								
SFRA Recommendation (Allocate/avoid)	Allocate	Allocate (East)/ Avoid (West)	Avoid	Avoid	Avoid	Avoid	Avoid	Avoid
EXCEPTION TEST								
Defended	×	×	×	×	×	×	×	×
Greenfield	✓	✓	✓	✓	✓	✓	✓	✓
Access during Flood Event	✓	To Burnside Cresc	Limited access to west	To A629	To Carleton Rd	To Otley Rd	To A629	×
Model available	✓	✓	✓	✓	✓	✓	✓	✓

Skipton - Flood zone 2 and 3	120 - West of the junction of Carleton New Road and Carleton Road	115 - Former Burnside Allotments, east of Carleton Road, west of Burnside Crescent	114 - Land bounded by Carleton Road, railway line, and A629 Skipton Bypass	116 - East of Skipton Bypass, south of Sandylands Playing Fields, and west of Carleton Road (Skipton South Site)	119 - West of Carleton Road, bounded by Eller Beck to west	102 - Land at Skibenden Beck, Otley Road	144 - West of Ings Lane	113 - South of sewage works, within Snaygill Industrial Estate
Comment	• **Exception test required for housing develop-ment in FZ 3a (10% of site).** • Housing in FZ 2 (4%) does not need exception test. • Depth of Flooding < 0.5m	• **Exception test required for housing develop-ment in FZ 3a (9.5% of site).** • Housing in FZ 2 (2%) does not need exception test. • Risk of surface water flooding. • Depth of Flooding < 1m	• **Exception test required for housing develop-ment in FZ 3a (56% of site).** • Housing in FZ 2 (0.5%) does not need exception test. • **2.5% of site in flood zone 3b** • Risk of surface water flooding. • Depth of Flooding < 1-2 m	• **39% of site in 3b** • Risk of surface water flooding. • Depth of Flooding < 0.5m	• **Exception test required for housing develop-ment in FZ 3a (0.2% of site).** • **79% of site in flood zone 3b.** • Risk of surface water flooding. • Depth of Flooding < 0.5m	• **Exception test required for housing develop-ment in FZ 3a (80% of site).** • Housing in FZ 2 (9%) does not need exception test. • Risk of surface water flooding. • Depth of Flooding. • Depth of Flooding < 1m	• **97% of site in floodzone 3b.** • Risk of surface water flooding. • Flooding > 2m in some parts of site	• • **97% of site in floodzone 3b.** • Risk of surface water flooding. • Access difficult during flood event. • Depth of Flooding < 0.5m

Skipton - Flood zone 2 and 3	120 - West of the junction of Carleton New Road and Carleton Road	115 - Former Burnside Allotments, east of Carleton Road, west of Burnside Crescent	114 - Land bounded by Carleton Road, railway line, and A629 Skipton Bypass	116 - East of Skipton Bypass, south of Sandylands Playing Fields, and west of Carleton Road (Skipton South Site)	119 - West of Carleton Road, bounded by Eller Beck to west	102 - Land at Skibenden Beck, Otley Road	144 - West of Ings Lane	113 - South of sewage works, within Snaygill Industrial Estate
SITE RECOMMENDATION								

Skipton - Flood zone 2 and 3	120 - West of the junction of Carleton New Road and Carleton Road	115 - Former Burnside Allotments, east of Carleton Road, west of Burnside Crescent	114 - Land bounded by Carleton Road, railway line, and A629 Skipton Bypass	116 - East of Skipton Bypass, south of Sandylands Playing Fields, and west of Carleton Road (Skipton South Site)	119 - West of Carleton Road, bounded by Eller Beck to west	102 - Land at Skibenden Beck, Otley Road	144 - West of Ings Lane	113 - South of sewage works, within Snaygill Industrial Estate
Recommendation for Development	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Use site layout to avoid developing in FZ 3. • Do not develop in flood zone 3b	• Adjust site boundary and/or design layout to avoid areas of flood risk - include as open space. • Consider access to site in flood events • Use site layout to avoid developing in FZ 3a. • Do not develop in flood zone 3b • Avoid area to west of the beck.	• Consider access to site during flood events at site design stage. • Site at risk of surface water flooding and this should be considered during site design. • Use site layout to avoid developing in FZ 3. • Investigate role of defences in managing risk at the site. •	• Consider access to site during flood events at site design stage. • Site at risk of surface water flooding and this should be considered during site design. • Use site layout to avoid developing in FZ 3. • Do not develop in flood zone 3b	• Consider access to site during flood events at site design stage. • Site at risk of surface water flooding and this should be considered during site design. • Use site layout to avoid developing in FZ 3. • Do not develop in flood zone 3b •	• Consider access to site during flood events at site design stage. • Use site layout to avoid developing in FZ 3.	• Consider access to site during flood events at site design stage. • Site at risk of surface water flooding and this should be considered during site design. • Do not develop in flood zone 3b • investigate role of culverts in flood risk at the site.	• Consider access to site during flood events at site design stage. • Site at risk of surface water flooding and this should be considered during site design. • Do not develop in flood zone 3b • investigate role of defences in managing risk at the site. •

8.3 Skipton Town Centre

8.3.1 Sites in Flood zones 2 and 3

Skipton Town centre has a history of flooding (see Craven District Council flooding hotspots information on map XX and section 4.3.3). Eller - Embsay Beck and Waller Hill Beck meet in the town centre before joining the River Aire on the western edge of the town. Eller Embsay Beck and Waller Hill Becks are culverted in the town centre and this is thought to have contributed to some recent flood events. The canal also passes through the town centre crossing the river on an aqueduct. The flood zones follow the route of the canal suggesting that the canal may act as a route for flood water through the town centre. A detailed modelling study of Eller -Embsay and Waller Hill Becks was carried out in 2000 (see table 3-1). Further investigation of the available flood risk data in a level 2 SFRA is required before a recommendation is made to allocate or avoid the following sites.

Site	Land Use	Area (Ha)	% Site in Flood zone 1[a]	% Site in Flood zone 2[a]	% Site in Flood zone 3a[a]	% Site in Flood zone 3b[a]	Source of watercourse flooding	Sources of flooding - recommended for Level 2 Investigation
Council Offices and land to south, off Granville Street (137)	Housing	1.27	99.76	0.00	0.24	0.00	Eller - Embsay Beck	Canal (either as a source of flooding or route to transfer flood waters). Culverts at confluence of Waller Hill Beck and Eller-Embsay Beck.
Industrial and commercial premises and land, west of Firth Street, east of Canal (123)	Mixed Use	2.49	99.29	0.26	0.45	0.00	Waller Hill Beck	
Cavendish Street Car Park and commercial premises (125)	Mixed Use	0.84	87.21	6.94	5.85	0.00	Waller Hill Beck/ Wilderness Beck	
Retail stores, north of Broughton Road (128)	Mixed Use	0.32	82.87	7.22	9.91	0.00	Waller Hill/ Eller - Embsay Beck	
Belle Vue Mills, Broughton Road (130)	Mixed Use	1.19	74.55	5.71	19.74	0.00	Eller - Embsay Beck	
Millfields Car Park, Coach Street/ Gargrave Road (131)	Mixed Use	1.26	74.42	9.18	16.40	0.00	Eller - Embsay Beck	

Site	Land Use	Area (Ha)	% Site in Flood zone 1[a]	% Site in Flood zone 2[a]	% Site in Flood zone 3a[a]	% Site in Flood zone 3b[a]	Source of watercourse flooding	Sources of flooding - recommended for Level 2 Investigation
Premises and car park at Bowers Wharf, Sackville Street (128)	Housing	0.16	50.37	6.49	43.13	0.00	Waller Hill/ Eller-Embsay Beck	
Fire Station and social club, Broughton Road (139)	Mixed Use	0.36	50.12	2.06	47.82	0.00	Waller Hill/ Eller-Embsay Beck	
Focus DIY Store, south of Broughton Road/ Belmont Street (129)	Mixed Use	0.97	5.94	16.40	20.06	57.59	Waller Hill/ Eller-Embsay Beck	
Victoria Buildings, Belmont Street, west of Canal (127)	Mixed Use	0.11	0.00	2.41	97.59	0.00	Waller Hill/ Eller-Embsay Beck	
Waller Hill Car Park, west of bus station, off Keighley Road (126)	Mixed Use	0.24	0.00	0.00	100.00	0.00	Waller Hill/ Eller-Embsay Beck	
Note a: Flood risk data needs further investigation and these values may change.								

8.3.2 Level 2 SFRA Recommendations for Skipton town centre:

- Review modelling study of Eller/ Embsay and Waller Hill Becks and carry out additional modelling as required.
- Review role of canal using both local knowledge and the modelling study. This should consider the role of the canal as a source of flooding and as a route for conveyance of flood water.
- Investigate the role of culverts in flood risk in Skipton Town centre.
- Investigate potential mitigation measures as required.

8.4 Crosshills Sites in Flood zones 2 and 3

Crosshills - Flood zone 2 and 3	318 - West of primary school, east of Hayfield Mills, Colne Road, Glusburn	302 - Corner of Skipton Road and Station Road	319 - South and east of Hayfield Mills, Colne Road, Glusburn	301 - Land at Ashfield Farm, Skipton Road	304 - Between Clayton Hall Road and Old Lane/ Holme Beck	300 - East of Riparian Way
Land Use	Housing	Employment	Housing	Employment	Mixed Use	Employment
Area (Ha)	0.78	0.89	1.75	12.06	10.87	3.66
% of site in FZ1	88.65	69.51	39.90	14.79	8.11	0.13
% of site in FZ 2	8.79	0.00	20.09	3.26	4.46	0.14
% of site in FZ 3a	2.56	30.49	40.01	42.80	56.81	0.65
% of site in FZ 3b	0.00	0.00	0.00	39.15	30.62	99.09
% site at risk of flooding (in FZ 2 or 3)	11.35	30.49	60.10	85.21	91.89	99.87
Total % of site vulnerable to surface water flooding	>50%	10% to 50%	>50%	>50%	>50%	>50%
Source of watercourse flooding	Holme Beck	Aire Flooded in Autumn 2000	Holme Beck CDC Flooding Hotspot	Aire /Eastburn Beck	Aire /Eastburn Beck CDC Flooding hotspot	Aire /Eastburn Beck
Other sources of flooding?	Surface water	Surface water	Surface water	Surface water	Surface water	Surface water
FZ 3 area requiring compensation flood storage - (Ha)	0.02	0.27	0.70	9.88	9.50	3.65
SEQUENTIAL TEST						
SFRA Recommendation (Allocate/avoid)	Allocate	Allocate	Avoid	Avoid	Avoid	Avoid

Crosshills - Flood zone 2 and 3	318 - West of primary school, east of Hayfield Mills, Colne Road, Glusburn	302 - Corner of Skipton Road and Station Road	319 - South and east of Hayfield Mills, Colne Road, Glusburn	301 - Land at Ashfield Farm, Skipton Road	304 - Between Clayton Hall Road and Old Lane/ Holme Beck	300 - East of Riparian Way
EXCEPTION TEST						
Defended	×	Opposite bank	×	Aire at confluence	Aire at Confluence	Aire
Greenfield	✓	×	×	✓	✓	✓
Access during Flood Event	To Colne Rd	To A6068	To A6068	To Skipton Rd	×	×
Model available	Glusburn Beck	Glusburn Beck	Glusburn Beck	Glusburn Beck	Glusburn Beck	Glusburn Beck
Comment	• **Exception test required for housing development in FZ 3a (2.6% of site).** • Housing in FZ 2 (9%%) does not need exception test. • Risk of surface water flooding. • Depth of Flooding < 0.5m	• 30% of site in floodzone 2 or 3. • Risk of surface water flooding. • Depth of Flooding < 0.5m	• **Exception test required for housing development in FZ 3a (40% of site).** • Housing in FZ 2 (20%) does not need exception test. • Risk of surface water flooding. • Depth of Flooding mostly < 1m	• **39% of site in floodzone 3b** • Risk of surface water flooding. • Depth of Flooding up to 2m on east side of site.	• **Exception test required for housing development in FZ 3a (57% of site).** • Housing in FZ 2 (4.5%) does not need exception test. • 31% of site in floodzone 3b • Risk of surface water flooding. • Access difficult during 1 in 100 flood event. • Depth of Flooding up to 2m in the north east of the site	• **99% of site in floodzone 3b.** • Risk of surface water flooding. • Access difficult during 1 in 100 flood event. • Depth of Flooding up to 2m.

Crosshills - Flood zone 2 and 3	318 - West of primary school, east of Hayfield Mills, Colne Road, Glusburn	302 - Corner of Skipton Road and Station Road	319 - South and east of Hayfield Mills, Colne Road, Glusburn	301 - Land at Ashfield Farm, Skipton Road	304 - Between Clayton Hall Road and Old Lane/ Holme Beck	300 - East of Riparian Way
SITE RECOMMENDATION						
Recommendation for Development	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Site at risk of surface water flooding and this should be considered during site design. • Use site layout to avoid developing in FZ 3.	• Consider access to site during flood events at site design stage. • Use site layout to avoid developing in FZ 3. • Investigate role of defences in risk at the site.	• Consider access to site during flood events at site design stage. • Site at risk of surface water flooding and this should be considered during site design. • Use site layout to avoid developing in FZ 3.	• Consider access to site during flood events at site design stage. • Site at risk of surface water flooding and this should be considered during site design. • Use site layout to avoid developing in FZ 3. • Do not develop in flood zone 3b • Investigate role of R. Aire defences in managing risk at the site.	• Consider access to site during flood events at site design stage. • Site at risk of surface water flooding and this should be considered during site design. • Use site layout to avoid developing in FZ 3. . • Do not develop in flood zone 3b • Investigate role of R. Aire defences in managing risk at the site.	• Consider access to site during flood events at site design stage. • Site at risk of surface water flooding and this should be considered during site design. • Do not develop in flood zone 3b • Investigate role of R. Aire defences in managing risk at the site. • Other

8.5 Skipton and Crosshills Sites Marginally in Flood zones 2 and 3

Skipton and Crosshills Sites Marginally in Flood zones 2 and 3						
Skipton and Crosshills - Marginal Flood zone 2 and 3	**327 - West of Station Road and north of railway line, Crosshills**	**326 - North-west of Glusburn/ Crosshills, bounded by railway to north, Baxter Wood/ Park Road, and Station Road, Crosshills**	**141 - Mill and builders yard north of Marton Street, Sawley Street and Clitheroe Street, Skipton**	**101 - Land at Elseycroft, south of Otley Road and north of Airedale Avenue, Skipton**	**133 - Chinthurst and Peter Watson Garage Site, Otley Road, Skipton**	**100 - Hawbank Fields north of Otley Road and south of A6132, Skipton**
Land Use	Housing	Mixed Use	Housing	Housing	Housing	Housing
Area (Ha)	3.01	14.00	0.99	11.62	0.39	6.06
% of site in FZ1	96.90	92.73	99.33	98.20	96.39	92.29
% of site in FZ 2	2.99	3.79	0.00	0.10	1.74	1.03
% of site in FZ 3a	0.03	3.48	0.67	1.70	1.87	6.68
% of site in FZ 3b	0.07	0.00	0.00	0.00	0.00	0.00
% site at risk of flooding (in FZ 2 or 3)	3.10	7.27	0.67	1.80	3.61	7.71
Total % of site vulnerable to surface water flooding	<10%	<10%	10 to 50%	10 to 50%	10 to 50%	10 to 50%
Source of watercourse flooding	Aire	Aire	Gallow Syke/possibly flood zone outlier	Waller Hill Beck	Waller Hill Beck/ Wilderness Beck	Waller Hill Beck Skibenden Beck

Skipton and Crosshills Sites Marginally in Flood zones 2 and 3						
Skipton and Crosshills - Marginal Flood zone 2 and 3	**327 - West of Station Road and north of railway line, Crosshills**	**326 - North-west of Glusburn/ Crosshills, bounded by railway to north, Baxter Wood/ Park Road, and Station Road, Crosshills**	**141 - Mill and builders yard north of Marton Street, Sawley Street and Clitheroe Street, Skipton**	**101 - Land at Elseycroft, south of Otley Road and north of Airedale Avenue, Skipton**	**133 - Chinthurst and Peter Watson Garage Site, Otley Road, Skipton**	**100 - Hawbank Fields north of Otley Road and south of A6132, Skipton**
SEQUENTIAL TEST						
SFRA Recommendation (Allocate/avoid)	Allocate	Allocate	Allocate	Allocate	Allocate	Allocate
SITE RECOMMENDATION						
Recommendation for Development	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Consider access to site during flood events at site design stage. • Site at risk of surface water flooding and this should be considered during site design.					

8.6 Sutton in Craven Sites in Flood zones 2 and 3

Sutton in Craven - Flood Zone 2 and 3	316 - West of Holme Lane, south of Holme Beck and north of Baptist Church	310 - North of Bay Horse Inn, south of Wet Ings Lane	317 - West of Holme Lane and north of Holme Beck	305 - East of Holme Lane, north of Holme Beck and south of Playing Fields
Land Use	Housing	Mixed Use	Housing	Housing
Area (Ha)	2.75	0.59	0.88	6.43
% of site in FZ1	88.25	72.19	0.00	0.00
% of site in FZ 2	1.03	2.47	0.00	0.23
% of site in FZ 3a	10.72	25.34	100.00	49.15
% of site in FZ 3b	0.00	0.00	0.00	50.63
% site at risk of flooding (in FZ 2 or 3)	11.75	27.81	100.00	100.00
Total % of site vulnerable to surface water flooding	<10	10% to 50%	>50%	>50%
Source of watercourse flooding	Eastburn Beck	Sutton Beck	Eastburn Beck Flooded in August 2004	Eastburn Beck
Other sources of flooding?	×	×	×	Surface Water
FZ 3 area requiring compensation flood storage - (Ha)	0.29	0.15	0.88	6.41
EXCEPTION TEST				
SFRA Recommendation (Allocate/avoid)	Allocate	Allocate (part)	Avoid	Avoid
EXCEPTION TEST				
Defended	×	×	×	×
Greenfield	✓	×	✓	✓
Access during Flood Event	To Hazel Grove	Ellers Rd flooded	Holme Lane flooded in 1 in 100 flood	Holme Lane flooded in 1 in 100 flood
Model available	✓	✓	✓	✓

Sutton in Craven - Flood Zone 2 and 3	316 - West of Holme Lane, south of Holme Beck and north of Baptist Church	310 - North of Bay Horse Inn, south of Wet Ings Lane	317 - West of Holme Lane and north of Holme Beck	305 - East of Holme Lane, north of Holme Beck and south of Playing Fields
Comment	• **Exception test required for housing development in FZ 3a (11% of site).** • Housing in FZ 2 (1%) does not need exception test. • Depth of Flooding < 0.5m	• **Exception test required for housing development in FZ 3a (25% of site).** • Housing in FZ 2 (2.5%) does not need exception test. • Risk of surface water Flooding. • Depth of Flooding < 0.5m	• **Exception test required for housing development in FZ 3a (100% of site).** • Risk of surface water Flooding. • Access difficult in 1 in 100 flood event. • Depth of Flooding < 0.5m	• **Exception test required for housing development in FZ 3a (49% of site).** • 51% of site in floodzone 3b. • Risk of SW Flooding. • Access difficult in 1 in 100 flood event. • Depth of Flooding < 1m
SITE RECOMMENDATION				
Recommendation for Development	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Consider access to site during flood events at site design stage. • Site at risk of surface water flooding and this should be considered during site design. • Use site layout to avoid developing in FZ 3.	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Consider access to site during flood events at site design stage. • Use site layout to avoid developing in FZ 3.	• Consider access to site during flood events at site design stage. • Site at risk of surface water flooding and this should be considered during site design.	• Consider access to site during flood events at site design stage. • Site at risk of surface water flooding and this should be considered during site design. • Do not develop in flood zone 3b

8.7 Ingleton Sites in Flood zones 2 and 3

Ingleton - Flood zone 2 and 3	658 - Three Peaks Residential Park and scrap yard, south of New Road	650 - Caravan Parks, north of River Greta	661 - Between industrial estate off New Road and Tatterthorn Road	659 - Adjacent to southern edge of industrial estate, off New Road	663 - Between Laundry Lane and New Road	662 - Telephone Exchange, south of Masons Arms, New Road	660 - South west of industrial estate, off New Road
Land Use	Housing	Housing	Employment	Employment	Housing	Employment	Employment
Area (Ha)	0.48	1.88	2.48	1.37	0.82	0.16	0.54
% of site in FZ1	86.23	81.38	52.66	46.65	31.57	18.47	0.94
% of site in FZ 2	12.79	3.20	6.32	34.72	12.36	51.41	1.61
% of site in FZ 3a	0.98	15.42	41.02	18.63	56.07	30.13	97.45
% of site in FZ 3b	0.00	0.00	0.00	0.00	0.00	0.00	0.00
% site at risk of flooding (in FZ 2 or 3)	13.77	18.62	47.34	53.35	68.43	81.53	99.06
Total % of site vulnerable to surface water flooding	<10%	10% to 50%	10% to 50%	<10%	10% to 50%	10% to 50%	<10%
Source of watercourse flooding	Jenkin Beck	Greta, Wiss + Doe confluence	Jenkin Beck	Jenkin Beck	Jenkin Beck + tributary	Jenkin Beck	Jenkin Beck
Other sources of flooding?	×	Surface Water	Surface Water	×	Surface Water	Surface Water	×
FZ 3 area requiring compensation flood storage - (Ha)	0.29	0.04	1.02	0.26	0.46	0.05	0.52

Ingleton - Flood zone 2 and 3	658 - Three Peaks Residential Park and scrap yard, south of New Road	650 - Caravan Parks, north of River Greta	661 - Between industrial estate off New Road and Tatterthorn Road	659 - Adjacent to southern edge of industrial estate, off New Road	663 - Between Laundry Lane and New Road	662 - Telephone Exchange, south of Masons Arms, New Road	660 - South west of industrial estate, off New Road
SEQUENTIAL TEST							
SFRA Recommendation (Allocate/avoid)	Allocate	Allocate	Avoid	Avoid	Avoid	Avoid	Avoid
EXCEPTION TEST							
Defended	×	Defences on opposite bank	×	×	×	×	×
Greenfield	×	×	✓	✓	✓	×	Rough ground
Access during Flood Event	To Rarber Top Lane, not to west	To B6265 (N)	×	To Enter Lane but no access from this to New Rd	North to Laundry Lane	×	×
Model available	×	×	×	×	×	×	×

Ingleton - Flood zone 2 and 3	658 - Three Peaks Residential Park and scrap yard, south of New Road	650 - Caravan Parks, north of River Greta	661 - Between industrial estate off New Road and Tatterthorn Road	659 - Adjacent to southern edge of industrial estate, off New Road	663 - Between Laundry Lane and New Road	662 - Telephone Exchange, south of Masons Arms, New Road	660 - South west of industrial estate, off New Road
Comment	• **Exception test required for housing development in FZ 3a (1% of site).** • Housing in FZ 2 (13%) does not need exception test.	• **Exception test required for housing development in FZ 3a (15% of site).** • Housing in FZ 2 (3%) does not need exception test.	• 47% of site in flood zone 2 or 3 • Risk of surface water flooding. • No access during flood event.	• 53% of site in flood zone 2 or 3 • Risk of surface water flooding. • Access difficult during flood event.	• **Exception test required for housing development in FZ 3a (56% of site).** • Housing in FZ 2 (12%) does not need exception test. • Risk of surface water flooding.	• 81% of site in flood zone 2 or 3 • Risk of surface water flooding.	• 99% of site in flood zone 2 or 3 • Access difficult during flood event.
SITE RECOMMENDATION							

Ingleton - Flood zone 2 and 3	658 - Three Peaks Residential Park and scrap yard, south of New Road	650 - Caravan Parks, north of River Greta	661 - Between industrial estate off New Road and Tatterthorn Road	659 - Adjacent to southern edge of industrial estate, off New Road	663 - Between Laundry Lane and New Road	662 - Telephone Exchange, south of Masons Arms, New Road	660 - South west of industrial estate, off New Road
Recommendation for Development	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Consider access to site during flood events at site design stage. • Use site layout to avoid developing in FZ 3.	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Consider access to site during flood events at site design stage. • Use site layout to avoid developing in FZ 3. • Avoid development on candidate 3b floodplain. • Investigate role of defences in managing risk at the site.	• Consider access to site during flood events at site design stage. • Site at risk of surface water flooding and this should be considered during site design. • Use site layout to avoid developing in FZ 3.	• Consider access to site during flood events at site design stage. • Use site layout to avoid developing in FZ 3.	• Consider access to site during flood events at site design stage. • Site at risk of surface water flooding and this should be considered during site design. • Use site layout to avoid developing in FZ 3.	• Consider access to site during flood events at site design stage. • Site at risk of surface water flooding and this should be considered during site design. • Use site layout to avoid developing in FZ 3.	• Consider access to site during flood events at site design stage. • Use site layout to avoid developing in FZ 3.

8.8 Hellified, High Bentham and Settle Sites in Flood zones 2 and 3

Hellified, High Bentham and Settle - Flood zones 2 and 3	801 - Between Gisburn Road and railway line, Hellifield	508 - West of Station Road, south of railway station, High Bentham	511 - East of Rose Cottage, Wenning Avenue, High Bentham	509 - Storage Yard and premises, west of Mayfield Road, south of Wenning Avenue, High Bentham	414 - NYCC Depot, north of King's Mill, Settle
Land Use	Housing	Employment	Housing	Housing	Housing
Area (Ha)	1.86	1.15	0.21	0.27	0.56
% of site in FZ1	30.60	67.29	0.00	0.00	3.71
% of site in FZ 2	69.40	32.71	64.25	54.24	0.07
% of site in FZ 3a	0.00	0.00	34.58	45.76	85.73
% of site in FZ 3b	0.00	0.00	1.17	0.00	10.49
% site at risk of flooding (in FZ 2 or 3)	69.40	32.71	100.00	100.00	96.29
Total % of site vulnerable to surface water flooding	>50%	<10%	>50%	>50%	10% to 50%
Source of watercourse flooding	Hellified Beck	Wenning CDC hotspot includes edge of site	Wenning	Wenning CDC hotspot	Ribble
Other sources of flooding?	Surface Water	×	Surface Water	×	Surface Water
FZ 3 area requiring compensation flood storage - (Ha)	0	0	0.07	0.12	0.54
SEQUENTIAL TEST					
SFRA Recommendation (Allocate/avoid)	Avoid	Allocate - site in Flood zone 2	Avoid	Avoid	Avoid
EXCEPTION TEST					
Defended	×	×	×	×	×
Greenfield	Part	×	✓	×	×

Hellified, High Bentham and Settle - Flood zones 2 and 3	801 - Between Gisburn Road and railway line, Hellifield	508 - West of Station Road, south of railway station, High Bentham	511 - East of Rose Cottage, Wenning Avenue, High Bentham	509 - Storage Yard and premises, west of Mayfield Road, south of Wenning Avenue, High Bentham	414 - NYCC Depot, north of King's Mill, Settle
Access during Flood Event	Gisburn Rd flooded in 1 in 1000	To Station Rd (N)	Wenning Ave Flooded in 1 in 100 event	Duke St Flooded in 1 in 1000 event	×
Model available	×	✓	✓	✓	✓
Comment	• Housing in FZ 2 (69%) does not need exception test. • Risk of surface water flooding. • Access difficult in flood event.	• 32% of site in floodzone 2 • Risk of surface water flooding.	• **Exception test required for housing development in FZ 3a (35% of site).** • Housing in FZ 2 (64%) does not need exception test. • Risk of surface water flooding. • Access difficult in 1 in 100 event.	• **Exception test required for housing development in FZ 3a (46% of site).** • Housing in FZ 2 (54%) does not need exception test. • Risk of surface water flooding. • Access difficult in 1 in 100 event.	• **Exception test required for housing development in FZ 3a (86% of site).** • Housing in FZ 2 (0.07%) does not need exception test. • **10.5% of site in floodzone 3b** • Risk of surface water flooding. • Access difficult in 1 in 100 event.
SITE RECOMMENDATION					
Recommendation for Development	• Consider access to site during flood events at site design stage. • Site at risk of surface water flooding and this should be considered during site design.	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Site at risk of surface water flooding and this should be considered during site design.	• Consider access to site during flood events at site design stage. • Site at risk of surface water flooding and this should be considered during site design. • Use site layout to avoid developing in FZ 3.	• Consider access to site during flood events at site design stage. • Site at risk of surface water flooding and this should be considered during site design. • Use site layout to avoid developing in FZ 3.	• Consider access to site during flood events at site design stage. • Site at risk of surface water flooding and this should be considered during site design. • Do not develop in flood zone 3b

8.9 Hellifield, Ingleton, Settle and Village Sites Marginally in Flood zones 2 and 3

Hellifield, Ingleton, Settle and Village Sites - Marginal Flood zones 2 and 3	605 - West of primary school, east of Anchor Bridge, Gargrave	710 - Grange Garth, Heslaker Lane, Carleton	741 - Station Works, north of Cononley Lane, Cononley	861 - East of Skipton Road adjacent to church and Middle Beck, Bradley	792 - North of Station, Embsay	800 - South of Sunningdale House and Hellifield House, east of Gisburn Road, Hellifield	802 - Townson Tractors, off Kendal Road, Hellifield	657 - East of New Village and south of Low Demesne, Ingleton	651 - South of River Greta, rear of Park View, The Brow, Ingleton	413 - Premises and fire station, Mill Close and Kings Mill Lane, Settle
Land Use	Housing	Housing	Mixed Use	Housing	Housing	Housing	Mixed Use	Housing	Housing	Housing
Area (Ha)	0.93	0.40	1.83	2.17	0.69	1.23	1.89	2.92	0.18	1.25
% of site in FZ1	99.86	97.47	92.34	87.44	81.53	98.25	95.08	98.65	93.98	97.67
% of site in FZ 2	0.14	0.80	0.00	1.57	0.59	1.75	3.10	0.77	4.87	0.00
% of site in FZ 3a	0.00	1.73	1.71	10.98	17.88	0.00	1.82	0.58	1.15	2.33
% of site in FZ 3b	0.00	0.00	5.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00
% site at risk of flooding (in FZ 2 or 3)	0.14	2.53	7.66	12.56	18.47	1.75	4.92	1.35	6.02	2.33
Total % of site vulnerable to surface water flooding	10% to 50%	10% to 50%	10% to 50%	10% to 50%	10% to 50%	10% to 50%	<10%	10% to 50%	<10%	10% to 50%
Source of watercourse flooding	Aire	Aire	Aire	Aire /Cononley Beck	Lathehouse Beck	Embsay Beck	Hellifield Beck	Hellifield Beck	Jenkin Beck	Greta

Hellifield, Ingleton, Settle and Village Sites - Marginal Flood zones 2 and 3	605 - West of primary school, east of Anchor Bridge, Gargrave	710 - Grange Garth, Heslaker Lane, Carleton	741 - Station Works, north of Cononley Lane, Cononley	861 - East of Skipton Road adjacent to church and Middle Beck, Bradley	792 - North of Station, Embsay	800 - South of Sunningdale House and Hellifield House, east of Gisburn Road, Hellifield	802 - Townson Tractors, off Kendal Road, Hellifield	657 - East of New Village and south of Low Demesne, Ingleton	651 - South of River Greta, rear of Park View, The Brow, Ingleton	413 - Premises and fire station, Mill Close and Kings Mill Lane, Settle
SEQUENTIAL TEST										
SFRA Recommendation (Allocate/avoid)	Allocate	Allocate	Allocate	Allocate	Allocate	Allocate	Allocate	Allocate	Allocate	Allocate
SITE RECOMMENDATION										
Recommendation for Development	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Consider access to site during flood events at site design stage. • Site may at risk of surface water flooding and this should be considered during site design.									

8.10 Craven Sites in Flood Zone 1

Settlement	Site ID	Name	Land Use	Area (Ha)	% of site at Risk of Surface Water Flooding
Bradley	860	Rear of Holly Tree House and Heath Lea, Skipton Road	Housing	1.01	<10%
	863	South west of Matthew Lane	Housing	0.20	<10%
	862	South of Lidget Road	Housing	0.63	<10%
Burton in Lonsdale	700	West of Ireby Road	Housing	2.21	<10%
Carleton	711	North of Dale Crescent, west of Beckside Farm	Housing	0.92	<10%
Clapham	730	Garage Site, Old Road	Housing	0.78	<10%
Cononley	740	East of Meadow Close and at Moorfoot Lane	Housing	1.33	<10%
Cowling	760	South of Acre Meadow and Laycock Fields	Housing	0.54	<10%
	761	Land off Old Lane, south of Acre Meadow	Housing	0.42	<10%
	765	Between Collinge Road and Cow Lane	Housing	0.38	<10%
	764	West of Fold Lane, east of Carr Mill	Housing	1.01	<10%
	767	East of Dick Lane	Housing	0.78	10% to 50%
	762	Former Mill and land, Acre Road	Housing	0.95	10% to 50%
	766	South of Colne Road, east of Welbeck House	Housing	2.93	10% to 50%
	768	South of Colne Road, east of Craven Court	Housing	0.50	10% to 50%
	763	Carr Mill, off Woodland Street	Housing	0.44	10% to 50%
	769	Off Wainmans Close, rear of Bannister Walk	Housing	1.54	10% to 50%
Crosshills	325	South of Park Road, north and east of Wheatlands House, Glusburn	Housing	1.15	<10%
	321	North of Old Hall Road/ Way, west of Green Lane, Glusburn	Housing	3.47	<10%
	303	Depot west of Station House, off Skipton Road	Employment	0.23	<10%
	323	South of Lothersdale Road, between Green Lane and Well Spring Farm, Glusburn	Housing	2.93	<10%
	324	Land bounded by Green Lane, Ryecroft Road, Black Abbey Lane/ Valley View and Park Road, Glusburn	Housing	4.02	<10%
	322	East of Green Lane and west of Black Abbey Lane, Glusburn	Housing	3.11	<10%
	320	West of Beanlands Drive and east of Sunny Bank Road, Glusburn	Housing	0.85	10% to 50%
Embsay	791	East of West Lane, north of Dalacres Crescent	Housing	1.42	<10%

Settlement	Site ID	Name	Land Use	Area (Ha)	% of site at Risk of Surface Water Flooding
	790	East of Laurel Croft, south and east of Village Hall	Housing	0.75	10% to 50%
	603	Between Church Street and Church Lane	Housing	0.35	<10%
	604	Neville House, Neville Crescent	Housing	0.42	<10%
	606	South of Marton Road, west of Church Croft	Housing	1.30	10% to 50%
	600	Land off Eshton Road, north of Canal	Housing	5.20	10% to 50%
	601	Caravan Park and warehousing, Eshton Road	Mixed Use	1.04	10% to 50%
Gargrave	602	Former Highways Depot, off Eshton Road	Employment	0.25	>50%
	415	South of Riversdale and north of school playing fields	Housing	0.22	<10%
	416	East of Castleberg Hospital, Raines Road	Housing	0.24	<10%
	421	South of junction of Lords Close and Bankwell Road	Housing	0.25	<10%
	420	Castleberg Hospital, Raines Road	Housing	1.04	<10%
	419	Between Morrison House and Raines Court, Raines Road	Housing	0.23	10% to 50%
	418	Between Raines Road and Tems Street	Mixed Use	0.57	10% to 50%
Giggleswick	417	South of Church Street, east of Tems Street	Housing	0.35	>50%
	803	Station Road	Housing	0.45	<10%
Hellifield	804	East of Thornfield Road, off Skipton Road	Housing	0.88	10% to 50%
	513	East of Furness Drive, west of Bigber Farm	Housing	0.31	<10%
	503	Bank Head, west of Robin Lane, south of Lakeber Drive	Housing	0.90	<10%
	500	Golf Club car park and clubhouse, Robin Lane	Housing	0.29	<10%
	506	Primary school, east of Robin Lane, west of Lowcroft	Housing	0.96	<10%
	515	North of Bigber Farm	Housing	1.81	<10%
	501	West of Robin Lane, east of Bankhead Farm	Housing	0.27	<10%
	510	West of High Bentham Business Park, south of Ashbank	Employment	0.21	<10%
	502	North of Lakeber Drive	Housing	0.87	<10%
	512	East of Duke Street and to rear of Main Street	Mixed Use	1.46	<10%
	505	North of Springfield Crescent and east of Butts Lane	Housing	4.07	10% to 50%
	516	North of Low Bentham Road, rear of Furness Drive and Moon Acres	Housing	3.04	10% to 50%
	507	East of Station Road and south-west pf Pye Busk, including the Cattle Market site	Mixed Use	10.87	10% to 50%
High Bentham	514	West of Goodenber Road and Wesley Way	Housing	1.13	10% to

Settlement	Site ID	Name	Land Use	Area (Ha)	% of site at Risk of Surface Water Flooding
					50%
	504	Rear of 38-54 Robin Lane and east of Butts Lane	Housing	3.58	10% to 50%
	667	Garage Site off Burnmoor Crescent	Housing	0.14	<10%
	653	Rear of Bower Cottages and Panwell, Backgate	Housing	0.22	<10%
	665	Corner of Main Street and Laundry Lane	Housing	0.53	10% to 50%
	654	Between Ingleborough Park Drive and Low Demesne, south-east of Backgate	Housing	6.40	10% to 50%
	652	South of High Street and east of Main Steet	Housing	0.48	10% to 50%
	666	North of Tansey Terrace, Backgate	Housing	0.39	10% to 50%
	655	Highways Depot and adjoining land, Backgate	Housing	1.30	>50%
Ingleton	656	North of Reid House, Low Demesne Close	Housing	0.30	>50%
Kildwick	830	Adjacent to the Old Smithy, bounded by Skipton Road and A630	Housing	0.52	<10%
	841	South of Greenhead Farm, Cross Lane/ Greenfoot Lane	Housing	0.24	<10%
	843	Corner of Cross Lane and Burton Road	Housing	0.56	<10%
	844	East of Hillside Road	Housing	1.10	<10%
	847	Wenning View and land to east and west, Low Bentham Road	Housing	2.23	<10%
	842	East of Greenhead Farm, Cross Lane	Housing	0.17	<10%
	845	North of Harley Close	Housing	0.56	10% to 50%
Low Bentham	840	West of Greenfoot Lane	Housing	0.42	10% to 50%
	406	South of Brockhole View and west of Brockhole Lane	Housing	1.11	<10%
	407	South of Ingfield Lane, east of Brockhole View	Housing	0.89	<10%
	409	Former Ingfield Garage, Skipton Road	Housing	0.21	<10%
	410	East of Runley Bridge Farm, bounded by railway line and B6480	Employment	1.70	<10%
	403	Police Station and land at Cragdale	Mixed Use	0.28	<10%
	404	Premises at The Sidings, railway station	Mixed Use	0.86	<10%
	422	Car park and land to east, off Lower Greenfoot and Commercial Street	Mixed Use	0.99	<10%
	405	Elderly persons home, Lower Greenfoot	Housing	0.55	<10%
	411	Ambulance Station and land to rear, off Cammock Lane	Housing	1.03	<10%
Settle	400	Between Langcliffe Road and railway	Housing	2.01	10% to 50%

Settlement	Site ID	Name	Land Use	Area (Ha)	% of site at Risk of Surface Water Flooding
	401	North of Townhead Way	Housing	1.10	10% to 50%
	412	East of garage and south of New Road, Sowarth Field Industrial Estate	Employment	0.17	10% to 50%
	408	East of Ingfield Avenue and south of Falcon Hotel and Ingfield Lane	Mixed Use	8.19	>50%
	402	Council Yard and car park, petrol filling station and shop, Quaker Garth/ Church Street	Mixed Use	0.71	>50%
	124	Workshop and garages, east of The Craven PH, Craven Street	Employment	0.19	<10%
	117	Burnside House, west of Carleton Road	Housing	0.97	<10%
	135	High Trees and The Paddock, The Bailey	Housing	0.93	<10%
	108	The Ghyll, north of Cawder Lane	Housing	0.57	<10%
	118	Croft House, Carleton Road	Housing	0.39	<10%
	149	Off Gargrave Road, north-east of Aireville Grange	Employment	2.88	<10%
	136	Former nursery east of 1a The Bailey	Housing	0.17	<10%
	153	Craven College, south of Gargrave Road	Employment	2.47	<10%
	150	Land bounded by White Hills Lane, A65, Stirtonber, and Parkwood Drive	Mixed Use	17.42	<10%
	109	East of Keighley Road and south of Cawder Lane	Mixed Use	1.17	<10%
	147	South of Gargrave Road, north of Craven College	Employment	1.12	<10%
	155	East of Overdale Caravan Park between Embsay Road and A65 Skipton by-pass	Employment	2.11	<10%
	132	High Street Car Park and buildings	Mixed Use	2.29	<10%
	148	North of Gargrave Road, at roundabout junction with A65	Employment	1.65	<10%
	140	Skipton Ambulance Station, Broughton Road	Housing	0.26	<10%
	111	Sneygill Adult Training Centre, Kieghley Road, Snaygill Industrial Estate	Employment	0.49	<10%
	112	Former petrol filling station, Keighley Road, Snaygill Industrial Estate	Employment	0.22	<10%
	104	Cefn Glas and land to south-east, Shortbank Road	Housing	1.13	<10%
	121	Skipton General Hospital, Keighley Road	Mixed Use	1.52	<10%
	152	Skipton Girls High School, Gargrave Road	Housing	2.43	<10%
	106	South of Shortbank Road, north og Greatwood Avenue	Housing	3.03	<10%
	154	East of junction of Skipton Road and Embsay Road	Housing	3.26	<10%
	146	North and west of Ling Fields, east of A629 Skipton Bypass	Employment	0.61	10% to 50%
Skipton	145	North and south of Auction Mart and to north of Canal, off Ling Fields	Mixed Use	9.73	10% to 50%

Settlement	Site ID	Name	Land Use	Area (Ha)	% of site at Risk of Surface Water Flooding
	151	Land bounded by A65, White Hills Lane and Raikes Road	Housing	2.45	10% to 50%
	103	East of Aldersley Avenue and south of Moorview Way	Housing	7.78	10% to 50%
	110	East of Canal, west of Sharphaw Avenue, north of Cawder Road, off Kieghley Road (Horse Close Site)	Housing	3.66	10% to 50%
	105	26 Shortbank Road and land to rear	Housing	0.28	10% to 50%
	143	South and west of Marina Crescent	Housing	0.41	10% to 50%
	142	Former allotments and garages, Broughton Roan, Ings Lane, Station View	Housing	0.64	>50%
Sutton	315	West and north of Hazel Grove Road, south of Holme Beck	Housing	3.40	<10%
	311	Gott Hill Farm, east of Ellers Road and south of Greenroyd Drive	Housing	0.76	<10%
	308	Salt Pie Farm and land south of Sutton Lane	Housing	1.70	<10%
	307	Land and premises, south of Bridge Road	Housing	0.31	<10%
	313	South-east of Crag Lane, adjacent to Crag Close and Willow Way	Housing	1.61	10% to 50%
	312	Works and land at Low Fold, Manor Way	Housing	0.20	10% to 50%
	314	North-west of Crag Lane and south of Bent Lane	Housing	5.30	>50%

9 Richmondshire District Council Site Tables

9.1 Location of Tables

Settlement	Table	Page
Richmondshire	Flood Zone 2 and 3	127
	Flood Zone 2 and 3 - Marginal Sites	131
	Flood Zone 1	133

9.2 Richmondshire Sites in Flood zones 2 and 3

Richmondshire - Flood zones 2 and 3	Scorton 143	Catterick Bridge 141	Catterick 142	Site 4, Pallett Hill Farm, Catterick Village (31)	Rowan Cottage The Green Cleasby DL22QZ (78)	Fairview, Cleasby, Nr Darlington, Co Durham, DL2 2QZ (35)	Land to the rear of: The Laurels Swale Pasture Lane Catterick Village North Yorkshire DL10 7NU (36)
Land Use	Housing	Housing	Housing	Housing	Housing	Housing	Housing
Area (Ha)	4.06	7.97	10.69	11.73	0.01	0.33	0.68
% of site in FZ1	77.18	77.09	62.23	29.00	0.00	0.00	0.00
% of site in FZ 2	5.57	11.25	2.06	0.00	0.00	0.00	0.00
% of site in FZ 3a	17.24	11.66	35.71	71.00	100.00	83.97	100.00
% of site in FZ 3b	0.00	0.00	0.00	0.00	0.00	16.03	0.00
% site at risk of flooding (in FZ 2 or 3)	22.82	22.91	37.77	71.00	100.00	100.00	100.00
Total % of site vulnerable to surface water flooding	10% to 50%	10% to 50%	10% to 50%	>50%	<10%	<10%	10% to 50%
Source of watercourse flooding	Scorton Beck	Swale	Brough Beck	Brough Beck (flooded in Autumn 2000)	River Tees	River Tees	Brough Beck
Other sources of flooding?	×	×	×	Surface water	×	×	Surface water flooding at margins of site

Richmondshire - Flood zones 2 and 3	Scorton 143	Catterick Bridge 141	Catterick 142	Site 4, Pallett Hill Farm, Catterick Village (31)	Rowan Cottage The Green Cleasby DL22QZ (78)	Fairview, Cleasby, Nr Darlington, Co Durham, DL2 2QZ (35)	Land to the rear of: The Laurels Swale Pasture Lane Catterick Village North Yorkshire DL10 7NU (36)
FZ 3 area requiring compensation flood storage - (Ha)	0.70	0.93	3.82	8.33	0.01	0.33	0.68
SEQUENTIAL TEST							
SFRA Recommendation (Allocate/avoid)	Allocate	Allocate (part north of Howe Hill Lane)	Avoid	Avoid	Avoid	Avoid	Avoid
EXCEPTION TEST							
Defended	×	Flood warning	Flood warning	×	✓	✓	Flood warning
Greenfield	✓	part	✓	✓	×	✓	✓
Access during Flood Event	✓	To north and west	No access in 1 in 100 flood event	To A1	×	×	×
Model available	×	×	✓	✓	✓	✓	✓

Richmondshire - Flood zones 2 and 3	Scorton 143	Catterick Bridge 141	Catterick 142	Site 4, Pallett Hill Farm, Catterick Village (31)	Rowan Cottage The Green Cleasby DL22QZ (78)	Fairview, Cleasby, Nr Darlington, Co Durham, DL2 2QZ (35)	Land to the rear of: The Laurels Swale Pasture Lane Catterick Village North Yorkshire DL10 7NU (36)
Comment	• **Exception test required for housing development in FZ 3a (17% of site).** • Housing in FZ 2 (6%) does not need exception test. • Risk of surface water flooding. • Depth of Flooding < 0.5m	• **Exception test required for housing development in FZ 3a (12% of site).** • Housing in FZ 2 (11%) does not need exception test. • Risk of surface water flooding. • Depth of Flooding < 1m	• **Exception test required for housing development in FZ 3a (36% of site).** • Housing in FZ 2 (2%) does not need exception test. • Risk of surface water flooding. • Depth of Flooding < 0.5m	• **Exception test required for housing development in FZ 3a (71% of site).** • Risk of surface water flooding. • Access difficult during flood event. • Depth of Flooding to 2m	• **Exception test required for housing development in FZ 3a (100% of site).** • Access difficult during flood event.	• **Exception test required for housing development in FZ 3a (84% of site).** • **16% of site in floodzone 3b** • Access difficult during flood event. • Depth of Flooding to 1.5m	• **Exception test required for housing development in FZ 3a (100% of site).** • Risk of surface water flooding. • Access difficult during flood event. • Depth of Flooding 0.5 to 1m
SITE RECOMMENDATION							

Richmondshire - Flood zones 2 and 3	Scorton 143	Catterick Bridge 141	Catterick 142	Site 4, Pallett Hill Farm, Catterick Village (31)	Rowan Cottage The Green Cleasby DL22QZ (78)	Fairview, Cleasby, Nr Darlington, Co Durham, DL2 2QZ (35)	Land to the rear of: The Laurels Swale Pasture Lane Catterick Village North Yorkshire DL10 7NU (36)
Recommendation for Development	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Site at risk of surface water flooding and this should be considered during site design. • Use site layout to avoid developing in FZ 3. • Avoid development on candidate 3b floodplain.	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Consider access to site during flood events at site design stage. • Use site layout to avoid developing in FZ 3. • Avoid development on candidate 3b floodplain.	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Consider access to site during flood events at site design stage. • Use site layout to avoid developing in FZ 3.	• Consider access to site during flood events at site design stage. • Site at risk of surface water flooding and this should be considered during site design. • Use site layout to avoid developing in FZ 3.	• Consider access to site during flood events at site design stage. • Investigate role of defences in managing risk at the site.	• Consider access to site during flood events at site design stage. • Use site layout to avoid developing in FZ 3. • Do not develop in flood zone 3b • Investigate role of defences in managing risk at the site.	• Consider access to site during flood events at site design stage. • Site marginally at risk of surface water flooding and this should be considered during site design. • Use site layout to avoid developing in FZ 3.

9.3 Richmondshire Sites Marginally in Flood zones 2 and 3

Richmondshire - Marginal Flood zone 2 and 3	Town Centre Redevelopment Catterick Garrison (119)	Hipswell Mill, Hipswell Catterick Garrison North Yorkshire DL9 4BG (82)	Hipswell 106	Arras Lines Additional Phase North of Sour Beck Catterick Garrison (125)	Land east of Strawgate Lane, Stapleton (22)	Site 3, Pallett Hill Farm (21)	Gough Road (MoD H/03) Catterick Garrison (121)
Land Use	Housing	Housing	Housing	Housing	Housing	Housing	Housing
Area (Ha)	5.91	4.42	6.35	3.83	0.59	3.16	1.24
% of site in FZ1	99.52	98.69	97.94	96.10	95.69	95.38	90.38
% of site in FZ 2	0.18	0.78	0.41	0.07	4.31	0.00	0.71
% of site in FZ 3a	0.31	0.53	1.65	3.83	0.00	4.62	8.91
% of site in FZ 3b	0.00	0.00	0.00	0.00	0.00	0.00	0.00
% site at risk of flooding (in FZ 2 or 3)	0.48	1.31	2.06	3.90	4.31	4.62	9.62
Total % of site vulnerable to surface water flooding	10% to 50%	10% to 50%	10% to 50%	10% to 50%	<10%	>50%	>50%
Source of watercourse flooding	Leadmill Beck	Colburn Beck	Colburn Beck	Sour Beck	River Tees	Brough Beck	Leadmill Beck
SEQUENTIAL TEST							

Richmondshire - Marginal Flood zone 2 and 3	Town Centre Redevelopment Catterick Garrison (119)	Hipswell Mill, Hipswell Catterick Garrison North Yorkshire DL9 4BG (82)	Hipswell 106	Arras Lines Additional Phase North of Sour Beck Catterick Garrison (125)	Land east of Strawgate Lane, Stapleton (22)	Site 3, Pallett Hill Farm (21)	Gough Road (MoD H/03) Catterick Garrison (121)
SFRA Recommendation (Allocate/avoid)	Allocate	Allocate	Allocate	Allocate	Allocate	Allocate	Allocate
SITE RECOMMENDATION							
Recommendation for Development	• Adjust site boundary and/or design layout to avoid areas of flood risk. Include flood risk areas as open space. • Consider access to site during flood events at site design stage. • Site may be at risk of surface water flooding and this should be considered during site design.						

9.4 Richmondshire Sites in Flood Zone 1

Settlement	Site ID	Name	Land Use	Area (Ha)	% of Site at Risk from Surface Water Flooding
	27	Regents Park Estate, Walkerville	Housing	4.31	<10%
	43	Plot at Colville Court Off Colville Road Colburn Catterick Garrison DL9 4LW	Housing	0.00	<10%
	58	Former playground Old sports field Catterick rd Colburn	Housing	0.66	<10%
	59	The Old Stackyard Colburn Hall DL9 4PE	Housing	0.13	<10%
	60	Hildyard Arms Colburn Village Catterick Garrison DL9 4PD	Housing	0.07	<10%
	69	See agents contact details	Housing	2.79	<10%
	72	depot opposite lowden house tunstall richmond dl0 7pw	Housing	0.54	<10%
	73	Tranquil, Gatherley Road, Brompton on Swale Richmond DL10 7JH	Housing	2.67	<10%
	74	Home Farm, Brompton on Swale, Richmond, North Yorkshire. DL10 7HE	Housing	0.16	<10%
	122	Coronation Park (MoD H/07) Catterick Garrison	Housing	0.72	<10%
	123	Catterick Road (MoD H/08) Catterick Garrison	Housing	0.25	<10%
	126	Piper Hill 126	Housing	2.72	<10%
	130	Scotton 130	Housing	34.17	<10%
	12	Hipswell Croft and adjacent land Hipswell North Yorkshire	Housing	3.04	<10%
	13	Hipswell Croft	Housing	0.85	<10%
	61	Land at Colburn Grange Farm, Colburn Catterick Garrison	Housing	3.34	<10%
	29	Catterick Road Colburn Catterick Garrison DL9 4RR	Housing	1.47	<10%
	105	Colburn 105	Housing	16.28	<10%
	124	E15 Employment Land to the South of Catterick Road.(MoD H/16 Catterick Garrison	Housing	3.89	10% to 50%
	129	Scotton 129	Housing	52.34	10% to 50%
	56	Old Sports Field Catterick Road Colburn	Housing	3.40	10% to 50%
	48	Land at Colburn	Housing	5.34	10% to 50%
	120	Land at Somerset Close Catterick Garrison	Housing	0.84	10% to 50%
	145	Brompton-on-Swale 145	Housing	19.41	10% to 50%
	140	Brompton-on-Swale 140	Housing	9.43	10% to 50%
Catterick	128	Piper Hill 128	Housing	15.19	10% to

Settlement	Site ID	Name	Land Use	Area (Ha)	% of Site at Risk from Surface Water Flooding
					50%
	64	Land at Colburn Grange Farm	Housing	3.66	10% to 50%
	26	land to the east of Walkerville, Brough St Giles	Housing	4.28	10% to 50%
	7	High Green, Catterick Village	Housing	0.61	10% to 50%
	14	Land west of Cliff Lodge, Leyburn	Housing	0.90	<10%
	53	Hill Top Farm, Leyburn, North Yorkshire, DL8 5DJ	Housing	4.03	<10%
	71	Leyburn Delivery Office (Not for Correspondence) Thornborough Hall Leyburn DL8 5AA	Housing	0.07	<10%
	87	OS6732 BRAEMONT LEYBURN NORTH YORKSHIRE DL85ES	Housing	0.24	<10%
	91	OS6636 BRAEMONT LEYBURN NORTH YKS DL85ES	Housing	0.40	<10%
	115	Leyburn 115	Housing	2.21	<10%
	117	Leyburn 117	Housing	1.13	<10%
	118	Leyburn 118	Housing	3.53	<10%
	65	Hill Top Farm, Moor Road, Leyburn, North Yorkshire, DL8 5DJ	Housing	9.84	<10%
	62	Land to the North of Woodburn Drive, Leyburn	Housing	4.69	<10%
	55	Hill Top Farm, Leyburn, North Yorkshire, DL8 5DJ	Housing	8.10	<10%
	114	Leyburn 114	Housing	1.93	<10%
	57	Hill Top Farm, Moor Road, Leyburn, North Yorkshire, DL8 5DJ	Housing	7.38	<10%
	92	OS7735 BRAEMONT LEYBURN NORTH YORKSHIRE DL85ES	Housing	0.78	10% to 50%
	116	Leyburn 116	Housing	4.33	10% to 50%
	41	MAYTHORNE FARM LEYBURN NORTH YORKSHIRE DL8 5HL	Housing	1.99	10% to 50%
	113	Leyburn 113	Housing	3.68	>50%
Leyburn	16	Land east of Leyburn (north of A684)	Housing	2.26	>50%
	37	Pilmoor Hill (Land at) Gilling Road Richmond	Housing	1.50	<10%
	38	Land at Gallowfields Industrial Estate Gallowfields Richmond	Housing	2.79	<10%
	54	2.37 acres of land adjoining A6108 near Skeeby on Richmond Road	Housing	0.94	<10%
	70	Hurgill Lodge Stables Hurgill Road Richmond	Housing	1.39	<10%
	81	Land at Green Howards Road/Quarry Road Richmnond	Housing	0.42	<10%
	108	Richmond 108	Housing	1.82	<10%
Richmond	109	Richmond 109	Housing	6.55	<10%

Settlement	Site ID	Name	Land Use	Area (Ha)	% of Site at Risk from Surface Water Flooding
	111	Richmond 111	Housing	1.32	<10%
	103	Field No NZ15017186 Drygill Quarry Hurgill Road Richmond	Housing	3.29	<10%
	112	Richmond 112	Housing	2.48	<10%
	104	Field No NZ15006097 Field No NZ15015509 Field No NZ15016604 Reeth Road Richmond	Housing	2.13	<10%
	110	Richmond 110	Housing	1.36	10% to 50%
	6	Moor House Middleton Tyas Richmond North Yorks DL10 6RT	Housing	0.20	<10%
	11	Land at St Alkelda's Road, Middleham	Housing	2.89	<10%
	28	Bank Top Constable Burton Leyburn	Housing	0.14	<10%
	45	GLEBE FARM EPPLEBY RICHMOND NORTH YORKSHIRE DL11 7AT	Housing	0.00	<10%
	51	O S 144 Town Head Field Moor Lane Dalton Nr Richmond	Housing	0.09	<10%
	83	Eryholme Lane Eryholme Darlington DL2 2PF	Housing	0.08	<10%
	84	Eryholme Lane Eryholme Darlington DP2 2PF	Housing	0.59	<10%
	88	Bellsgarth Dalton DL11 7HU	Housing	0.01	<10%
	93	BUILDING PLOT BANK TOP CONSTABLE BURTON LEYBURN NORTH YORKSHIRE DL85LN	Housing	0.11	<10%
	94	OS4983 CONSTABLE BURTON LEYBURN NORTH YORKSHIRE DL85RS	Housing	1.96	<10%
	100	ASHFIELD CLOSE CONSTABLE BURTON DL85RS	Housing	0.34	<10%
	107	Land adjacent to Springfield House and Cordilleras Farm Stanwick Road Aldbrough St John	Housing	0.22	<10%
	133	Barton 133	Housing	1.69	<10%
	85	Eryholme Lane Eryholme Darlington DP2 2PF	Housing	0.29	<10%
	75	Land to the rear of Spring Leas and Orchard Close, Hunton, Bedale, North Yorks.	Housing	1.25	<10%
	136	Scotch Corner 136	Housing	2.85	<10%
	76	Eryholme Lane Eryholme Darlington DL2 2PF	Housing	0.36	<10%
	32	Land to the north of Tofta House, Ravensworth. Field OS no 3797	Housing	1.47	<10%
	34	Land at Scotch Corner OS 1269 and OS 3336	Employment	35.52	<10%
	135	Middleton Tyas 135	Housing	11.24	<10%
	101	Land Reg title No NYK303191 Part field on the south side of Hill Lane laying adjacent to the west boundary of Dalton village High Lane Dalton Nr Richmond	Housing	1.40	<10%
Rural	66	Old Slaughter House Kirby Hill Richmond DL11 7JH	Housing	0.80	10% to 50%

Settlement	Site ID	Name	Land Use	Area (Ha)	% of Site at Risk from Surface Water Flooding
	132	Melsonby 132	Housing	9.65	10% to 50%
	134	Barton 134	Housing	7.62	10% to 50%
	9	Land south of Stapleton	Housing	0.72	10% to 50%
	46	BUTTS EPPLEBY RICHMOND NORTH YORKSHIRE	Housing	0.00	>50%
	52	Clara Meyer South Side Scorton Richmond North Yorks DL10 6DN	Housing	0.03	<10%
	80	Land South of St Mary's C of E Primary School Scorton	Housing	2.92	<10%
	144	Scorton 144	Housing	1.70	<10%
Scorton	50	Clara Meyer South Side ScortonRichmond North Yorks DL10 6DN	Housing	0.69	<10%

10 SFRA Recommendations

10.1 Introduction

SFRAs are more than a land use planning tool, and can provide a much broader and inclusive vehicle for integrated, strategic and local Flood Risk Management (FRM) assessment and delivery. Since publication of the Pitt Review, it is apparent that SFRAs will provide the central holder for data, information and consideration for all flood risk issues relating to flooding from all sources at a local level; and provide the linkage between CFMPs, SMPs, RFRAs, SWMPs and appropriate sustainable land uses over a number of planning cycles.

The NW Yorkshire SFRA has provided this pivotal vehicle in the introduction and promotion of a local authority, post Pitt Review, role in local flood management. The SFRA has been produced to be fit for the future, to help communities meet the considerable flood risk management and climate change related challenges that lay ahead.

In order to achieve this each council must take a lead role in FRM, continue the work of this Level 1 SFRA, and increase the understanding and information available on flood risk issues. There are a number of additional plans, which could add to the understanding, and of flood risk from all sources. These are outlined below with recommendations of whether or not they would benefit Harrogate Borough, Craven District and Richmondshire District.

10.2 Level 2 SFRA

This Level 1 SFRA has provided the evidence base for each council to apply the Sequential Test as set out in PPS25. Whilst the suite of Flood Risk Maps provided will help inform the decision making process and go some way in informing the likelihood of passing the Exception Test, they do not provide the local understanding and the level of detail required to carry out the Exception Test.

A detailed Level 2 SFRA should be produced to gain a greater understanding of the flood mechanisms and residual risks, concentrate on specific locations, to provide the data needed to understand the likelihood that sites will pass part c) of the Exception Test – whether the development will be safe.

These specific locations should be apparent where flood risk has been identified within this Level 1 SFRA as a critical issue but development is still required to meet the wider sustainable objectives.

The scope of a Level 2 SFRA is provided in PPS25 and its Practice Guide. It should include the detailed nature of the flood hazard within a Flood Zone including:

- Flood probability
- Flood depth
- Flood velocity
- Rate of onset of flooding.

The Level 2 SFRA should also provide information on flood defences including their location, standard of protection, condition and an assessment of defences breaching and overtopping.

The Regional Spatial Strategy (RSS - discussed in Appendix D of Volume I) states that

"*Plans, strategies, investment decisions and programmes should aim to avoid increasing flood risk, and manage land and river catchments for flood mitigation. . .*"

In addition Harrogate, Craven and Richmondshire LDFs have a strategic vision which identifies areas where development will be focussed, this is summarised in Volume I, Appendix D).

10.2.1 Harrogate Borough

The Strategic vision of Harrogate BC identifies Harrogate and Knaresborough as the main areas for development. In Ripon, continued regeneration is proposed and in smaller local service centres a certain amount of development of homes and community facilities is proposed (Boroughbridge, Pateley Bridge and Masham). Sequential Testing of SHLAA sites should be carried out by Harrogate District Council.

Harrogate Borough Council have considered some of their sites in Flood Zones 3a and 3b and indicated that development / regeneration of brownfield sites may be considered in areas of flood risk in Harrogate, Knaresborough, Ripon, Masham, Pateley Bridge, Boroughbridge and in smaller villages with limited options for development.

If the Exception Test is required for key proposed development sites identified at high risk, it is recommended that the scope of the Level 2 SFRA include the investigation and assessment of:

- Residual risk behind defences in Harrogate (Oak Beck and Cow Dyke Beck), Pateley Bridge and Boroughbridge based on condition of defences and operational knowledge held by Harrogate BC and the Environment Agency. Sites behind defences are identified in tables in section 7.5 (Harrogate), 7.6 (Pateley Bridge) and 7.7. (Boroughbridge).
- Risk on the River Ure floodplain in NE Ripon. Carry out 2D modelling to identify detailed depth, velocity and flowpaths across the floodplain.
- The role of the Ripon canal in flood risk in east Ripon.

- Depth and velocity mapping in Masham based on existing JFLOW 2D modelled output for Swinney Beck.
- Risk at key proposed development sites in smaller settlements (e.g. Markington, Tockwith, Birstwith, Glasshouses and Staveley Mill Farm) where sites remain following Sequential Testing.

It is also recommended that further consultation with Yorkshire Water, Harrogate Borough Council and the Environment Agency is carried out to refine and agree potential Critical Drainage Areas discussed in the Level 1 SFRA.

10.2.2 Craven District

Craven District Council identify Skipton as the principal service centre which will accommodate much of the development in the district. Local service centres (Settle and Giggleswick, Glusburn / Crosshills with Sutton-in-Craven and High Bentham) will play an important role in developing services. In smaller service centres (Gargrave and Ingleton) limited development will be permitted, elsewhere development will be restricted to meet local needs. Sequential Testing of allocation sites should be carried out by Craven District Council.

If the Exception Test is required for key proposed development sites identified at high risk it is recommended the scope of a Level 2 SFRA is to include the investigation and assessment of:

- Review Flood Risk in Skipton Town Centre - flood zones and the influence of the canal.
- Detailed flood risk mechanisms including depth and velocity in Skipton and Crosshills / Glusburn / Sutton-in-Craven.
- Flood depths in Settle, this information was not available during the level 1 SFRA.
- Residual risk from key large raised reservoirs
- Residual risk associated with the Leeds and Liverpool Canal through Craven District.

It is also recommended that further consultation with Yorkshire Water, Craven District Council and the Environment Agency is carried out to refine and agree potential Critical Drainage Areas discussed in the Level 1 SFRA.

10.2.3 Richmondshire District

Richmondshire District Council is currently developing its LDF Core Strategy. This will focus on Richmond and the Garrison Area for principal town functions in the area. A large proportion of future development is likely to take place in the Garrison area. The important role of Leyburn as a local service centre for communities in the Lower Wensleydale area will be supported. Development outside of the main towns will be appropriate to the scale of the smaller settlements.

Sequential Testing of potential allocation sites should be carried out by Richmondshire District Council. This will direct development to areas of lower flood risk.

If the Exception Test is required for key proposed development sites identified at high risk it is recommended the scope of a Level 2 SFRA is to include the investigation and assessment of:

- Detailed depth of flooding at sites next to the A1 west of Catterick.

It is also recommended that further consultation with Yorkshire Water, Richmondshire District Council and the Environment Agency is carried out to confirm that there are no Critical Drainage Areas as proposed in the Level 1 SFRA.

10.3 Other Recommendations

The „Pitt Review", „PPS25", the „Making Space for Water and Integrated Urban Drainage" pilots and the „Draft Flood and Water Management Bill" recognise the need for clearer roles and responsibilities for different sources of flood risk, with the current legislative framework leading to a fragmented and piecemeal approach for managing urban flood risk. A local leadership role for local flood risk issues has emerged whereby local authorities will need to have in place a strategy to manage these risks, of which a Surface Water Management Plan (SWMP) is an integral part.

10.3.1 Surface Water Management Plan

Surface water flooding is a major source of flood risk and as demonstrated by the summer 2007 floods can lead to serious flooding of property and possessions. These impacts can typically be mitigated through the implementation of established „best practice" drainage techniques including Sustainable Drainage Systems (SuDS) at the planning application stage. However, in some circumstances site constraints dictate that a catchment-wide, holistic approach to surface water flood management is required through urban catchment planning and strategic consideration of the design, construction, maintenance and improvement of sewers and watercourses. Local Authorities need to take a lead role with close liaison between Water Companies and the Environment Agency is essential to ensure a consistent and co-ordinated approach to surface water management and this may be best achieved by the production of appropriate Surface Water Management Plans (SWMPs).

SWMPs are developed by a partnership between a Local Authority, Water Company and the Environment Agency. They provide an opportunity to:

- Develop a framework for joint working and data sharing (which is a fundamental part of flood risk management under the draft Flood and Water Management Bill),
- Collate a central geographic database of drainage assets and flood risk issues,
- Assess the likelihood of surface water flooding through various modelling approaches,
- Assess the risk of surface water flooding to people, properties and the environment,
- Communicate this risk to local communities,
- Assess the costs and benefits of various flood risk reduction measures,
- Provide a drainage strategy for areas of significant development if appropriate, and
- Provide a framework for implementation and monitoring of the surface water strategy for a given area.

The Defra SWMP guidance is based on the Integrated Urban Drainage pilots undertaken as part of Making Space for Water and is currently being tested by six national pilot studies. The government outlined its future intentions towards the development of SWMPs in the Government Response to the Pitt Review into the 2007 floods, setting aside £5m for the development of a further 50 SWMPs for high priority locations (which will be decided on a national basis). SWMPs should achieve the level of data sharing with water companies and analysis using detailed sewer network models that is the next stage down from the SFRA.

- LPAs should consider developing SWMP, particularly in areas with critical drainage problems.

10.3.2 Water Cycle Studies

Water Cycle Studies (WCS) are an all encompassing study of the capacity in water supply, waste water infrastructure and water in the environment, aimed at those regions that are expecting growth. Its main aim is to ensure that new development can be supplied with the required water services it needs in a sustainable way.

To ensure that growth at a council scale can be supplied with sufficient water supply and wastewater treatment facilities, without detrimentally affecting the natural water cycle, it is essential to consider the water infrastructure needs as early in the planning process as possible. A WCS will provide Harrogate, Craven and Richmondshire Councils and development organisations with the necessary planning tool for this purpose and the planning base to support their LDF.

- There is a potential for significant development in the Catterick Garrison area of Richmondshire District. A Water Cycle Study for this area is recommended to ensure that there is adequate water infrastructure.

10.3.3 Recommendations for Critical Drainage Areas (CDAs)

SFRAs provide the opportunity for local authorities to assess at a strategic level the risk from multiple sources of flooding, which can then feed into more detailed assessments where appropriate by both themselves and other operating authorities. This includes the identification of Critical Drainage Areas. Critical Drainage Areas are those identified from historical flood events and / or modelled data as having a significant risk from surface water flooding and include drainage catchments for the sewer network, where there is high risk of surface water flooding or the network is at capacity (these were not provided for the SFRA). Recommendations can then be made for the future provision of SWMPs in high risk locations or areas of significant development for which an integrated drainage solution is possible that can reduce flood risk both to the development and elsewhere.

Critical Drainage Areas (CDAs) proposed in this SFRA provide a strategic overview of those areas which are at risk of flooding from surface water, the drainage catchments for the sewer network. CDAs identified are a good starting point for recommending SWMPs or Drainage Strategy.

A SWMP and a WCS should be twin tracked when they are prepared for the areas of interest. Whilst the SWMP would address surface water management the remaining issues of water supply and sewage treatment should be included within the WCS. Harrogate, Craven and Richmondshire Councils will need to provide evidence that their allocated development sites can be sustainably delivered and that flood risk and water supply has been investigated. SWMPs and WCS would provide this information however; they will not automatically be required.

- It is recommended that further consultation with Yorkshire Water, each Council and the Environment Agency is carried out during Level 2 SFRAs to finalise the suggested Critical Drainage Areas

10.3.4 Green Infrastructure Framework

Green spaces can be used to manage storm flows and free up water storage capacity in existing infrastructure to reduce risk of damage to urban property, particularly in city centres and vulnerable urban regeneration areas. Green Infrastructure (GI) can also improve accessibility to waterways and improve water quality, supporting regeneration and improving opportunity for leisure, economic activity and biodiversity.

River corridors identified as Functional Floodplain are an excellent linkage of GI and can provide storage during a flood event. Areas identified within the urban environment or upstream of a critical surface water flood areas should be incorporated into council GI strategies. Opening up land to create flow paths or flood storage areas can help protect current and future property.

10.4 Summary

The above section has recommended a number of further studies which could provide each council with more detailed flood risk information within their area. This „extra" level of detail would help inform the application of the Sequential and Exception Tests and go some way in outlining key FRM policy and mitigation approaches in reducing and controlling flood risk.

Table 10-1: Summary of Recommended Studies

Study	Location	Scope	Timetable
Level 2 SFRA	Harrogate BC	To assess: • Residual risk behind defences in Harrogate (Oak Beck and Cow Dyke Beck), Pateley Bridge and Boroughbridge based on condition of defences and operational knowledge held by Harrogate BC and the Environment Agency. • Risk on the River Ure floodplain in NE Ripon. Carry out 2D modelling to identify detailed depth, velocity and flowpaths across the floodplain. • The role of the Ripon canal in flood risk in east Ripon. • Depth and velocity mapping in Masham based on existing JFLOW 2D modelled output for Swinney Beck. • Risk at key proposed development sites in smaller settlements (e.g. Markington, Tockwith, Birstwith, Glasshouses and Staveley Mill Farm) where sites remain following Sequential Testing. • Finalise CDAs with Yorkshire Water, Harrogate BC and the Environment Agency	To fit with LDF timetable
	Craven DC	To assess: • Detailed flood risk mechanisms including depth and velocity in Skipton and Crosshills / Glusburn / Sutton in Craven. • Flood depths in Settle, this information was not available during the level 1 SFRA. • Residual risk from key large raised reservoirs • Residual risk associated with the Leeds and Liverpool Canal through Craven District. • Finalise CDAs with Yorkshire Water, United Utilities, Harrogate BC and the Environment Agency.	To fit with LDF timetable
	Richmondshire DC	• To assess detailed depth of flooding at sites next to the A1 west of Catterick.	To fit with LDF timetable
Water Cycle Study	Richmondshire District Council	• Water Cycle Study of proposed development areas in Catterick Garrison area	To fit with LDF timetable.

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